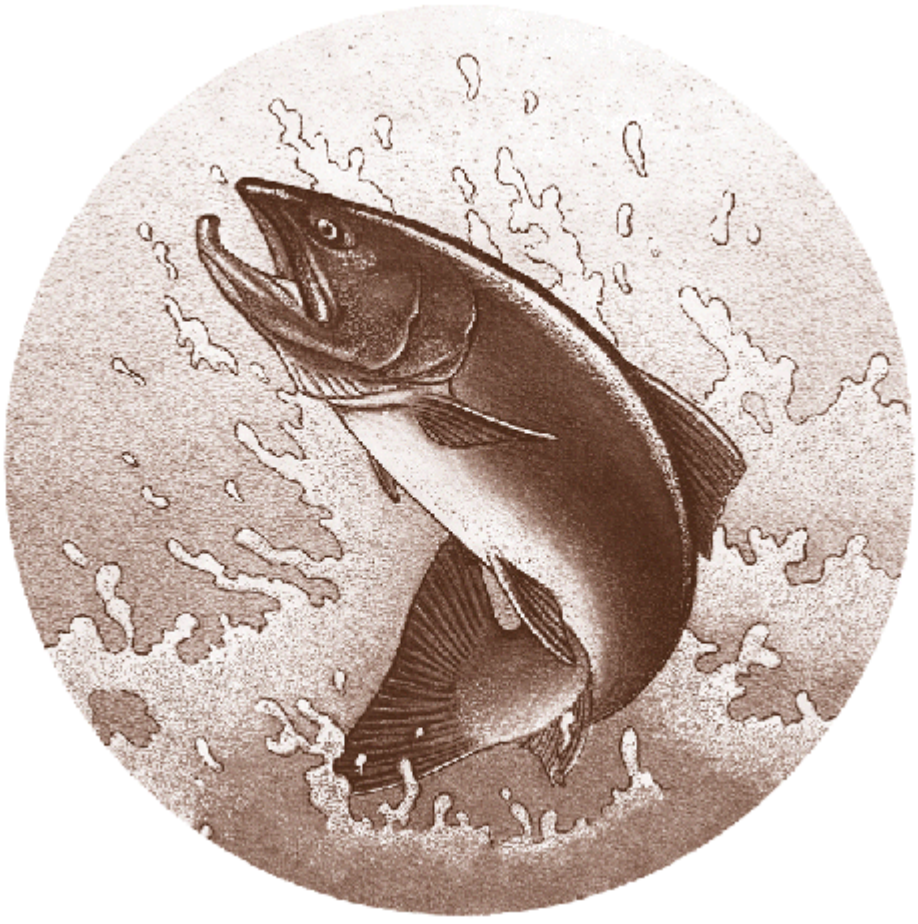
June 1999

SALMON SUPPLEMENTATION STUDIES IN IDAHO RIVERS (covering field work completed from 1992 to 1998)

Annual Report 1998



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BPA PROJECT 1989-098-03

FY 1998 ANNUAL REPORT
(Covering field work completed from 1992 to 1998)

SALMON SUPPLEMENTATION STUDIES IN IDAHO RIVERS

REPORT TO:

BONNEVILLE POWER ADMINISTRATION

SHOSHONE-BANNOCK TRIBES FISHERIES DEPARTMENT

FORT HALL, IDAHO

SALMON SUPPLEMENTATION STUDIES IN IDAHO RIVERS

Progress Report

Period Covered: January 1, 1996 to December 31, 1998

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Project No. 89-098-3
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June 1999

PREFACE

This project, No. 89-098-03, was funded by the Bonneville Power Administration (BPA) under Contract No. 92-BI-49450. This annual report contains information detailing Shoshone-Bannock tribal fisheries work completed from 1992 to 1998. This report includes information reported in November 1996 (data collected from 1992 to 1995).

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ABSTRACT

Information contained in this report summarizes the work that has been done by the Shoshone-Bannock Tribes Fisheries Department under BPA Project No. 89-098-3, Contract Number 92-BI-49450. Relevant data generated by the Shoshone-Bannock Tribe will be collated with other ISS cooperator data collected from the Salmon and Clearwater rivers and tributary streams. A summary of data presented in this report and an initial project-wide level supplementation evaluation will be available in the ISS 5 year report that is currently in progress.

The Shoshone-Bannock Tribal Fisheries Department is responsible for monitoring a variety of chinook salmon (*Oncorhynchus tshawytscha*) production parameters as part of the Idaho Supplementation Studies (BPA Project No. 89-098-3, Contract Number 92-BI-49450). Parameters include parr abundance in tributaries to the upper Salmon River; adult chinook salmon spawner abundance, redd counts, and carcass collection. A rotary screw trap is operated on the East Fork Salmon River and West Fork Yankee Fork Salmon River to enumerate and PIT-tag chinook smolts. These traps are also used to monitor parr movement, and collect individuals for the State and Tribal chinook salmon captive rearing program. The SBT monitors fisheries parameters in the following six tributaries of the Salmon River: Bear Valley Creek, East Fork Salmon River, Herd Creek, South Fork Salmon River, Valley Creek, and West Fork Yankee Fork. Chinook populations in all SBT-ISS monitored streams continue to decline. The South Fork Salmon River and Bear Valley Creek have the strongest remaining populations.

Snorkel survey methodology was used to obtain parr population estimates for ISS streams from 1992 to 1997. Confidence intervals for the parr population estimates were large, especially when the populations were low. In 1998, based on ISS cooperator agreement, snorkeling to obtain parr population estimates was ceased due to the large confidence intervals.

A rotary screw trap was operated on the West Fork Yankee Fork during the spring, summer, and fall of 1998 to monitor juvenile chinook migration. A screw trap was also operated on the East Fork of the Salmon River during the spring and fall from 1993 to 1997.

Supplementation treatments have occurred on the South Fork Salmon River (IDFG), the East Fork Salmon River (EFSR), and the West Fork Yankee Fork of the Salmon River (WFYF). The EFSR received supplementation treatments yearly through 1995. There have been no treatments since 1995, and no significant future treatments from local broodstock are planned due to extremely poor escapement. The WFYF received a single presmolt treatment in 1994. There was an egg and adult release treatment in 1998 from the captive rearing program, not part of the original ISS study. Similarly, no significant future treatments are planned for the West Fork Yankee Fork due to extremely poor escapement. However, small scale experimental captive rearing and broodstock techniques are currently being tested with populations from the EFSR and WFYF. Captive rearing/broodstock techniques could potentially provide feedback for evaluation of supplementation. The other three SBT-ISS streams are control streams and do not receive supplementation treatments.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF APPENDICES

INTRODUCTION

The Idaho Supplementation Studies (ISS) is a multiple agency effort to evaluate supplementation as a tool for helping to recover declining stocks of chinook salmon (*Oncorhynchus tshawytscha*) in Idaho rivers. The ISS is a cooperative effort between the Idaho Department of Fish and Game (IDFG), Nez Perce Tribe (NPT), Shoshone-Bannock Tribes (SBT), U. S. Fish and Wildlife Service (USFWS), and the University of Idaho(UI). Each cooperator is responsible for different aspects of the studies objectives either individually or jointly with one or more of the other cooperators. Supplementation is being evaluated as an interim recovery tool to help maintain and restore declining chinook salmon stocks before and after mainstem Snake and Columbia River travel corridors are altered to reduce juvenile and adult mortality. A detailed description of the studies' experimental design can be found in "Salmon Supplementation Studies in Idaho Rivers" (Bowles and Leitzinger 1991).

The SBT are responsible for monitoring and evaluating the implementation of supplementation study objectives in six streams in the Salmon River system (Project No. 89-098-3, Contract Number 92-BI-49450). Three are designated treatment streams: East Fork Salmon River (above the Idaho Department of Fish and Game adult weir), South Fork Salmon River (above the Idaho Department of Fish and Game adult weir), and West Fork Yankee Fork Salmon River. The other three streams are control streams: Bear Valley Creek (above the confluence of Elk Creek), Herd Creek, and Valley Creek. The designations of treatment and control streams may change in the future based on whether treatments have occurred or will occur in the future.

In order to evaluate treatment effects a number of production and productivity response variables, as defined below, are monitored. Production variables measure the effects of supplementation on returning adults, redd density, parr density, emigrants, and number of smolts to the lower Snake River. Productivity variables measure the effects of supplementation on the overall replacement ability and performance of natural populations. Productivity variables include female: male ratio, run timing, survival, and age structure.

Final evaluation of supplementation is dependent on the response of adult escapement to treatments (Bowles and Leitzinger 1991). Several interim production and productivity evaluation points have been established to provide baseline information and initial feedback on population responses to treatments prior to adult returns. This report focuses on parr abundance, PIT-tagging summer parr, fall and spring emigration estimates, PIT-tagging for emigration survival estimates, and spawning ground surveys. A more detailed discussion of these evaluation points is contained in the ISS experimental design.

Information contained in this report will be collated with other ISS cooperator data collected from Salmon and Clearwater River tributary streams. A summary of data presented in this report and supplementation evaluation will occur at a project-wide level in the ISS 5 year report (in progress).

OBJECTIVES

The first five years (1992 to 1997) of data collection provide baseline information. Subsequent data collection (1998 to 2007) should provide results of supplementation treatments and will be compared to baseline information to assess supplementation effects. The primary use of data collected by individual ISS cooperators will be to provide supplementation analysis on a project-wide basis (ISS Five year report, *in progress*).

The project objectives are:

1. To monitor and evaluate the effects of supplementation on presmolt and smolt numbers and spawning escapement of naturally produced chinook salmon.
2. To monitor and evaluate changes in natural productivity and genetic composition of target and adjacent populations following supplementation.
3. To determine which supplementation strategies (broodstock and release stage) provide the quickest and highest response in natural production without adverse effects on productivity.
4. To develop supplementation recommendations.

ISS is an attempt to address several questions associated with two unknowns: "Does supplementation work?" and "What supplementation strategies work best?". These questions are:

1. Does supplementation of existing chinook salmon populations in Idaho enhance natural production?

2. Does supplementation with existing hatchery stocks establish natural populations of chinook salmon in areas of Idaho where chinook salmon were extirpated?

3. Does supplementation of existing chinook salmon populations in Idaho reduce natural productivity of target or adjacent populations below acceptable levels (e.g., replacement)?

4. How often is supplementation required to maintain populations at satisfactory levels?

5. Can existing hatcheries and broodstocks be used effectively to supplement target populations within local or adjacent subbasins?
6. Is there an advantage to developing new and localized broodstocks with a known natural component for supplementation of existing natural populations?

7. Which life stage release (i.e., parr, presmolt, smolt) provides the quickest and highest response in rebuilding natural populations?

8. What effect does life stage at release have on existing natural productivity and genetic composition?

The above queries relate directly to questions 2, 3, 6, and 7 specified as important critical uncertainties by the Supplementation Technical Work Group (1988). In addition to addressing these questions the results of this project have general application to salmon recovery in the Columbia River Basin. The Salmon Supplementation Studies in Idaho Rivers will furthermore provide case history evaluations of several supplementation programs in Idaho.

STUDY AREA

The six tributaries of the Salmon River drainage monitored by the SBT include Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF).

Bear Valley Creek, located in Valley County, Idaho, flows northeast for 54.5 km to its confluence with Marsh Creek to form the Middle Fork of the Salmon River. BVC is a control stream in which no supplementation occurs. Chinook salmon populations were monitored in that portion of BVC from the confluence with Elk Creek to the headwaters. BVC is generally a low to medium gradient system that meanders through subalpine meadows and lodgepole pine (*Pinus contorta*) forest in a granitic batholith. Alluvial deposits of highly erosive sandy soils typify the region. All land in the BVC drainage is under federal ownership as part of the Boise National Forest. Current uses in BVC include system-wide livestock grazing, timber harvest, and recreation.

East Fork Salmon River is located in Custer County, Idaho. EFSR is a treatment stream receiving hatchery smolts which are progeny of adult chinook salmon collected at the IDFG adult weir 29 river kilometers upstream of the confluence with Salmon River. Chinook salmon populations were monitored in that portion of EFSR from the IDFG adult weir to the headwaters. Upper EFSR is generally a low to medium gradient system which flows through moderately wide valleys of lodgepole pine and Douglas fir (*Pseudotsuga menziesii*) forests, improved pasture rangelands, sagebrush/grass areas, and narrow canyons. Most of the system is roaded and lies in an area of Challis Volcanics which is characterized by highly erosive sandy and clay-loam soils. Adjacent lands are managed by the Salmon-Challis National Forest, Sawtooth National Forest, Salmon District Bureau of Land Management, and private landowners.

Herd Creek, a tributary of the EFSR, is located in Custer County, Idaho. HC is a control stream in which no supplementation occurs. Chinook salmon populations were monitored in that portion of HC from just above its confluence with the EFSR to the headwaters. HC is generally a low gradient system which flows through a moderately narrow valley of improved pasture rangelands and sagebrush/grass. Most of the system lies in an area of Challis Volcanics which is characterized by highly erosive sandy and clay-loam soils. Adjacent lands are managed by the Salmon-Challis National Forest, Salmon District Bureau of Land Management, and private landowners.

South Fork Salmon River is located in Valley County, Idaho. SFSR is a treatment stream receiving hatchery smolts reared from eggs collected from adult chinook salmon trapped at the IDFG adult weir. Chinook salmon populations were monitored in that portion of SFSR from the IDFG adult weir to the

headwaters. Upper SFSR is generally a low to medium gradient system which flows through wide grass valleys of lodgepole pine and Douglas fir, and a reach of narrow canyons. Adjacent lands are managed by the Boise National Forest and private landowners.

Valley Creek, located in Custer County, Idaho, is a major tributary to the Salmon River. VC is a control stream in which no supplementation occurs. Chinook salmon populations were monitored in that portion of VC from the confluence with the Salmon River to the headwaters. VC is generally a low to medium-low gradient system that meanders through subalpine meadows and lodgepole pine forest. Adjacent lands are managed by the Salmon-Challis National Forest, Sawtooth National Recreation Area, and private landowners.

West Fork Yankee Fork Salmon River (WFYF) located in Custer County, Idaho, is a major tributary to the Yankee Fork Salmon River. WFYF is a treatment stream which received hatchery chinook salmon presmolts in 1994 from eggs collected from adult chinook salmon trapped at the IDFG Sawtooth Fish Hatchery. Chinook salmon populations were monitored in that portion of WFYF from the confluence with the Yankee Fork Salmon River to the headwaters. WFYF is a low to moderately high gradient system that meanders through subalpine meadows and lodgepole pine forest. Adjacent lands are managed by the Salmon-Challis National Forest.

METHODS

Parr Abundance

For purposes of this report, juvenile salmon lifestages are broken out as follows: Fry - swim-up until 30 June; Parr - 1 July until 31 Aug; Presmolts - 1 Sept until 1 Jan; Smolts - 1 Jan until 30 June.

Chinook salmon parr abundance was estimated by collecting snorkeling data at multiple sites on each of the study streams. Snorkeling data was collected using standardized procedures as described by Thurow (1994). All streams were snorkeled during July and the first part of August in an attempt to document the summer rearing population of chinook salmon parr. Attempts were made to limit

snorkeling activities to periods when water temperatures were above 10 C and underwater visibility was greater than 3 m. At water temperatures below 10 C stream-dwelling salmonids tend to seek concealment cover, making them more difficult to locate and count (Thurow 1994). During the few snorkel sessions when underwater visibility was less then 3 m additional snorkelers were added.

Fish observed during snorkel counts were identified by species and size (estimated to the nearest 10 millimeters). Length information was collected in this manner so each fish could later be assigned to an age group. Fish counts were either recorded on underwater slates or called to a data recorder on the streambank. Only the presence or absence of sculpins (*Cottus spp.*) and dace (*Rhinichthys spp.*) was noted because their cryptic nature makes accurate counts difficult. The following fish were observed in one or more of the study streams: chinook salmon, steelhead (*Oncorhynchus mykiss*), westslope cutthroat trout (*O. clarki lewisi*), brook trout (*Salvelinus fontinalis*), bull trout (*S. confluentus*), mountain whitefish (*Prosopium williamsoni*), sucker (*Catostomus spp.*), dace, sculpin, and redside shiner (*Richardsonius balteatus*).

The streams were subdivided into sampling strata based on stream size, channel type (Rosgen 1985), gradient, and traditional chinook salmon usage for both spawning and rearing. A description of strata boundaries and lengths can be found in Appendix A. Systematically established snorkel sites were spaced from 400 to 800 m apart in each stratum. Each site was composed of one or more habitat units defined as a specific habitat type confined at both the upper and lower borders by a hydraulic control. For the purposes of this study, four habitat types were utilized: pool, riffle, run, and pocket water. Pool, riffle, and run (glide) habitats correspond to the general habitat categories and definitions described by Bisson et al. (1982). Pocket water is predominantly moderate velocity run habitat with numerous protruding boulders forming "pockets" of low velocity behind them. A list of streams, strata, number of sites sampled per stratum, number of each habitat type sampled per stratum, and predominate channel type present are listed in Table 1.

Population size was estimated from snorkeling data using a stratified systematic design (Scheaffer et al. 1986, Van Den Avyle 1993). Estimates were calculated by snorkel site (the area snorkeled irrespective of habitat type) and by habitat type. The variability in fish count data was expected to be less

between units of the same habitat type than between sites composed of one or more different habitat types. The net benefit of using habitat type data would be a reduction in the variability of the final population estimate.

Using the relatively vigorous methods described above to estimate summer chinook parr populations, results on a project-wide basis showed large confidence intervals and coefficients of variation. ISS cooperators modified their sampling design to reduce the variation around parr population estimates without success.

In the spring 1998, ISS cooperators decided to indefinitely discontinue effort in obtaining summer parr population estimates due to poor results. In the past, data was collected for the General Parr Monitoring (GPM) database during ISS snorkeling activities. Cooperators decided to continue to snorkel GPM sites to provide trend information on juvenile densities without expending significant effort. GPM data will not be presented in this report, but is available in report form from Idaho Department of Fish and Game, Fisheries Research.

Habitat Measurements

After snorkeling a site, each habitat unit was measured to determine surface area. Between one and six width measurements were taken for each unit depending on the unit's length and the stream sinuosity. The length of each unit was measured along the thalweg between the hydraulic controls forming the unit's boundaries. The snorkel sites were measured by habitat type so population estimates could be generated by habitat type or by site.

Each study stream was habitat-typed by stratum during redd counts conducted in late August 1993. EFSR was habitat-typed again in 1995 due to high water levels to better represent the habitat types present. A crew member would record the habitat type adjacent to their position every 10 paces while conducting redd counts. Each observation was tallied under one of four columns: pool, riffle, run, or pocket water. These data were used to determine the percent of each habitat type present, by stratum, for each stream (Table 2). Habitat assessments for Elk Creek and Stanley Lake Creek, tributaries of Valley

Creek, were done by Sawtooth National Recreation Area crews in 1990 and 1992, respectively. Information on the percent of each habitat type present for Curtis Creek was provided by the Forest Service from work conducted in 1991. The data were ultimately used to calculate population estimates by habitat type.

Redd Counts

Redd counts were conducted on five ISS streams by SBT crews and on the SFSR by IDFG crews between the first of August and the first week of October using procedures outlined in IDFG's Redd Count Manual (Hassemer 1991). Each stream was counted between two and four times at approximately 11-day intervals. Multiple ground counts allowed crews to be on the stream either during redd construction or shortly thereafter, thus aiding in redd identification. Multiple counts also increased the number of adult chinook salmon carcasses recovered. In 1998, additional surveys were conducted with the sole purpose of collecting a greater number of carcasses. Redd count information was summarized by stream and stratum. The location of each redd encountered in 1994 and 1996 through 1998 was recorded on USGS, 7.5 minute topographic maps. Redd locations provide information about spawning distribution between years at different escapement levels and areas of probable high rearing densities the following summer.

Information was collected from each adult chinook salmon carcass encountered. For each carcass, crews measured the fork length and mid-eye to hypural plate length to the nearest centimeter; determined the sex and percent spawned; and checked each fish for fin clips, tags, and radio transmitters. Carcass fork length data was generally grouped into the following age classes: jack ($\leq$ 62 cm), 2-ocean (63-79 cm), and 3-ocean ($\geq$ 80 cm) (Hassemer 1993). In some years, the age of carcasses we recovered was determined based on the Sawtooth Fish Hatchery estimated length at age. Sawtooth Fish Hatchery was able to collect known length at age data from a portion of adult returns to the weir due to coded wire tag and PIT-tag recoveries.

In addition, scales were collected following procedures set forth by Hassemer (1991). Genetic tissue samples and otoliths were collected from all carcasses encountered in 1997. In 1998, genetic tissue

samples and fin rays were collected from all carcasses, and in Bear Valley Creek otoliths were collected where possible. At the end of each field season scale samples, fin rays, and genetic tissue samples were sent to IDFG Research to be analyzed or to be archived for future analysis. Otoliths collected in 1998 were transferred to the Forest Service's Intermountain Research Laboratory in Boise, ID.

Rearing, Marking, and Releases

Supplementation fish were reared in existing Idaho Department of Fish and Game hatcheries and satellite facilities following standard hatchery practices. A subsample of juvenile chinook salmon were PIT-tagged in the hatchery prior to release. The experimental design called for PIT-tagging up to 500 chinook salmon smolts released in the spring and 1,000 chinook salmon presmolts released in the fall from each treatment (i.e. hatchery release). Fish were PIT-tagged primarily to evaluate survival from time of release to detection at the lower Snake River dams. All treatment fish were initially marked with an adipose, and a right or left pelvic fin clip to enable identification of adult returns and ensure differentiation from natural adults for broodstock collection. The SBT has captured juvenile chinook salmon from the EFSR and WFYF intermittently over the course of this project for the captivity for rearing/broodstock program (IDFG and NMFS).

Treatment fish were upper Salmon River stock reared at Sawtooth Fish Hatchery. Table 3 summarizes treatment activities that have been conducted on the EFSR and WFYF. The West Fork Yankee Fork received 25,025 adipose clipped presmolts with 1,000 PIT tagged in 1994 (Table 3). These fish were helicoptered in to the WFYF and were not acclimated. In 1997, the first adults (4 jacks)from the captive rearing program were released back into their natal stream WFYF. In 1998, 44 adults were released in WFYF with the remainder held in the hatchery for broodstock. (Table 3). WFYF also received an eyed-egg supplementation of 3,393 eggs in 1998. These were placed in stream side refrigerator hatch boxes within Whitlock-Vibert boxes. These incubators had an estimated 92% hatch rate producing 3,126 fry (SBT unpublished data).

Supplementation fish trucked to the East Fork Salmon River were released with no acclimation at two locations in 1995. The initial release of 31,250 chinook salmon smolts with 499 PIT tagged occurred

near Wickiup Creek from March 28-30, 1995. A second group of 17,595 fish with high levels of bacterial kidney disease were released at the EFSR adult weir on April 3, 1995. Supplementation fish released in 1995 had a left pelvic fin clip. No brood stock from the years of 1995-1997 were released. The first adult supplementation took place in 1997 with the release of 4 jacks. The EFSR received 15,240 eyed-eggs in 1998 taken from captive brood stock (Table 3). These eggs were placed in gravel using Jordan-Scotty boxes and had a 90% hatch rate, producing an estimated 13,875 fry. There was no adult release in 1998 with all fish spawned in the hatchery for broodstock. These treatments will be monitored in coordination with SBT-ISS. A summary and history of the East Fork Salmon River adult weir operations and hatchery program since installation and proposed supplementation efforts are given in Bowles and Leitzinger (1991). The results of South Fork Salmon River treatments are reported in IDFG-ISS reports.

Juvenile Trapping

A rotary screw trap (EG Solutions, Corvallis, Oregon) was operated on the WFYF about 25 meters upstream from the confluence of the Yankee Fork Salmon River to trap emigrating juvenile chinook salmon during 1998. The trap was suspended in the thalweg of the channel by a cable strung across the stream. From 1992 to 1997, most ISS trapping occurred only during the spring (ice off until high water) and fall migrations (mid-August until ice up). In 1998, ISS cooperators decided to operate traps for the entire summer to obtain a better estimate of an entire cohort's production. Table 4 provides a summary of screw trap operations. One goal of trapping is to capture and PIT-tag up to 500 emigrating chinook salmon as smolts, presmolts, and parr.

From 1993 to 1997 a screw trap was operated (Table 4) about 300 m downstream of the Idaho Department of Fish and Game adult weir on the EFSR for the same purposes as mentioned above. Traps were operated in the same general manner regardless of location. Trapping activities were discontinued on the East Fork Salmon River in 1998 due an extremely low estimate of emigrating juveniles expected from brood year 1996. No redds were observed in the EFSR above the IDFG weir in 1996. Trapping

was resumed on the EFSR in 1999. The WFYF also has had consistent depressed redd counts since the beginning of the project.

In 1998, 21 redds were observed in the EFSR above the IDFG weir. For the first time since project inception, the weir did not operate during the chinook salmon migration. ISS cooperators are currently discussing whether to trap brood year 1998 juveniles from the EFSR (Hassemer, personal communication).

Traps were generally checked twice daily, in the morning and in the evening just before dusk. During the morning check all fish were removed and sorted into separate buckets by size. Chinook salmon (> 55 mm), steelhead (> 70 mm), and bull trout were collected in buckets and transported to a tagging tent or trailer. The average, maximum, and minimum fork length of PIT-tagged chinook salmon by year and season is presented in Table 5. Minimum size of chinook salmon juveniles PIT-tagged varied between years and has ranged from 55 to 65 mm. In 1998, chinook less than 65 mm in length were not PIT-tagged. ISS cooperators agreed to PIT-tag chinook 60 mm or greater in 1999. Non-target species were counted, measured to the nearest millimeter (fork length), sometimes weighed, sometimes PIT-tagged, and released below the trap. Environmental variables such as air and water temperature, stage (water level), weather, and water clarity were recorded on the daily trapping sheet. During the evening check all fish tagged during the day were released, and the trap was checked to make sure it was operating properly. In some circumstances, fish tagged in the morning were allowed to recover for 15 to 30 minutes and were then released above the trap. Environmental variables such as water temperature and stage level were recorded on the release data sheet.

Mechanical failures, high flows, debris, ice, scheduling constraints, and other situations resulted in occasional suspension of trap operation. There were some periods of up to a week and longer when the trap was not operating correctly and in situations not operating at all. During these periods newly tagged fish released above the trap may not have had the same likelihood of being recaptured. When the trap was not operating or only operated partially, or when flows increased or decreased significantly, or when the trap was moved to a different part of the channel, fish recapture probabilities changed significantly.

Recapture probabilities may change as frequently as day to day. A season-long efficiency estimate was used to calculate a population estimate.

Discharge was monitored at the screw trap by establishing a permanent stage gage and developing a general linear model relating actual discharges (m^3/s) with stage readings. Discharge was measured using the United States Geological Survey midsection method (Orth 1983). Velocities were measured using a Swoffer current meter.

Steelhead greater than 70 mm and all bull trout caught were tagged to assist projects being administered by the IDFG. PIT-tagging of steelhead and bull trout was conducted during the spring of 1994 and fall of 1993, and continued throughout trap operations in 1997 and 1998. Scale samples were collected from bull trout on the left side of the fish as described for adult chinook salmon in the redd count manual. Bull trout scale samples were transferred to IDFG Fisheries Research.

During 1997 and 1998, a portion of juvenile chinook salmon caught in the screw trap were kept in holding boxes and transferred to Sawtooth Fish Hatchery for IDFG's captive rearing program. The EFSR and WFYF were trapped in 1997, and only the WFYF was trapped in 1998. In 1997, trapping on the WFYF was done cooperatively between the Tribes and IDFG Research with the sole purpose of collecting chinook salmon juveniles for captive rearing. No other information or biological samples were collected while trapping on the WFYF in 1997.

Fish were PIT-tagged daily following procedures defined by Kiefer and Forster (1991) and the PIT-tag Steering Committee (1992). PIT-tagging data were recorded by using a PIT-tagging Station (Biomark Inc., Boise, Idaho) following methods outlined in Prentice et al. (1990). No more than 20 juveniles were anesthetized (MS-222 and sodium bicarbonate buffer) at one time and equipment was sterilized in a 70% ethanol solution to reduce transmission of disease. After tagging, most fish were held in flow through boxes until dusk when they were released.

Tagged fish were released in calm water above at least the first riffle upstream from the screw trap. During the spring of 1993 fish were held for approximately 30 hours (until dusk of the day after tagging) to monitor mortality and tag retention. There was no delayed mortality or tag loss detected during that time period and this practice was discontinued. After the spring of 1993 all fish were not held longer

than 24 hours. Fish were alternately released from the right and left bank. Chinook salmon juveniles were always released on the opposite bank from any steelhead trout or bull trout being released. The recapture of tagged fish allowed for estimation of trap efficiency. Recaptured fish were released downstream of the screw trap.

Trapping efficiency was calculated for each trapping season separately. The total number of emigrants was estimated by using a trap efficiency calculated for the entire trapping period and for one calculated by month. Trap efficiency was estimated by:

$$p = r/n; \qquad (1)$$

where p is the estimated trap efficiency, r is number of marked fish recaptured, and n is number of marked fish.

In 1996, ISS coordinators determined the use of the method described in Fleiss (1981), for calculation of confidence intervals for a proportion (trap efficiency), would be more appropriate than methods used in the past. Fleiss (1981) provides equations for proportions which are appropriate when the products (n*p) and (n*q) are >5.

Where: p = trap efficiency

q = 1 - p

n = the number of fish tagged and released above the trap

When p is not $0.3 \leq p \leq 0.7$, equations (2) and (3) apply.

In all cases, trap efficiency was less than 0.3. Therefore, equations 2 and 3 were used in calculating 95% confidence limits for trap efficiencies. The lower limit of the trap efficiency confidence interval is calculated by:

$$P_L = [(2np+C^2-1)-C\{C^2-(2+1/n)+4p(nq+1)\}^{1/2}]/2(n+C^2) \qquad (2)$$

where C is the critical value of a two-tailed significance test at the .05 level of significance for a binomial distribution. The upper limit of the trap efficiency confidence interval is calculated by:

$$P_U = [(2np+C^2+1)+C\{C^2+(2-1/n)+4p(nq-1)\}^{1/2}]/2(n+C^2) \qquad (3)$$

Population estimates of the total number of fish emigrating past the screw trap were calculated for the time interval in which the trap was operated. The population estimate was calculated by using the

proportion of marked fish to recaptured fish (trap efficiency) to expand the unmarked catch and estimate the total number of fish emigrating (Thedinga et al. 1994).

The total number of fish emigrating was estimated by:

$$N = U/p; \qquad (4)$$

where N is the estimated number of fish emigrating, and U is the unmarked fish caught. Confidence limits (95%) for outmigrant population estimates were approximated by entering the lower and upper 95% confidence limits for the trapping efficiency into equation 4.

In 1998, ISS cooperators agreed to use the bootstrap method for calculating trap efficiencies, population estimates, and confidence intervals. All trapping estimates reported in the ISS Five Year Report (*in progress*) were calculated using the Bootstrap method. For purposes of this report, the Bootstrap method was used only in calculating estimates for 1998 trapping data.

Software developed by the National Marine Fisheries Service Auke Bay Laboratory was used to estimate trap efficiencies and numbers of chinook juveniles emigrating past the traps (ISS Five Year Report, *in progress*). The software calculates trap efficiency as follows:

$$\hat{E} = \frac{R+1}{M+1}$$

where $\hat{E}$ = trap efficiency, R = number of marked fish recaptured, and M = number of marked fish released above the trap. Trap efficiencies were calculated for two periods, fall (July 1 through December 31) and spring (January 1 through June 30). In 1998, the spring period was extended to July 6, the last day we caught brood year 1996 emigrants. The software then uses the bootstrap method to estimate the number of emigrants passing the trap (Efron and Tibshirani 1986, 1993, Murphy et al. 1992, Thedinga et al. 1994). Spring (smolt) and fall (presmolt) emigrant were estimates followed by 1,000 iterations to obtain each estimate. Confidence intervals (90%) were then calculated for each estimate, based on the percentiles of the bootstrap distribution (Buckland 1984, Efron and Tibshirani 1993).

Summer Parr PIT-tagging

One of the project objectives was to collect and tag chinook salmon parr. The goal was to tag up to 500 parr from each study stream for each year. In 1998, the SBT's ISS project worked with Steve Achord, National Marine Fisheries Service (NMFS), to collect and PIT-tag juvenile salmon in BVC, VC, and HC. In addition, NMFS PIT-tagged fish in the SFSR. Juvenile rearing densities in the EFSR and WFYF were not sufficient to make collecting efforts worthwhile. Collections were conducted using electrofishing techniques through a permit issued by NMFS. Detailed methods are described in Matthews et al. (1990) and Achord et al. (1994).From 1995 to 1997 the abundance of chinook salmon parr was too low to implement this objective.

Detections

PIT-tags are read when a tagged fish passes through an interrogation site at one of the detection facilities located within some of the Columbia River and Snake River dams and on traps on the Salmon and Snake Rivers. The interrogation sites are incorporated in the juvenile passage facilities at the dams. All detections are reported to the PIT Tag Information System (PTAGIS) database housed and administered by the Pacific States Marine Fisheries Commission. During migration years 1993 through 1998 detection facilities were operating at Little Goose Dam (GOJ), Lower Granite Dam (GRJ), Lower Monumental Dam (LMJ), and McNary Dam (MCJ).

The detection facilities only detect a portion of the tagged fish passing by the facility. For any group of tagged fish migrating past a dam with a detection facility, some will go though the facility and be interrogated, some will go through the turbines and not be interrogated, and some may be spilled and not be interrogated. The proportion of the tagged population passing through the detection facilities is difficult to determine and will vary for several reasons related to the operation of the dams and river conditions. Additionally, there is the assumption that tagged and untagged fish have the same survival rates. These facts need to be kept in mind when comparing rates of detection between years and between different groups of tagged fish.

PIT-tag detection information from migrating juvenile and adult salmon is available from the PTAGIS database. Observation summary reports can be generated in the PTAGIS database which provides information used to determine the number of tagged fish detected, travel time, dates of detections, etc. Fish detections in this report are an enumeration of the first detection of a given fish at any detection facility.

In the summer of 1998, the SBT worked cooperatively with NMFS (S. Achord) to PIT-tag summer parr in Bear Valley, Valley, and Herd Creeks. In 1998, juvenile chinook salmon that appeared to be precocial (based on size and in some cases evidence of milt) were not included in determining detection rates at downstream dams. Information from these tagging events are not included in this report. Results and analysis from summer parr tagging will be available in NMFS published reports and will also be included in future ISS project-wide summary reports.

RESULTS

Parr Abundance

Large confidence intervals associated with parr population estimates (Table 6) resulted in ISS cooperators deciding not to expend the extensive effort it takes to collect the information. The last year of snorkeling data used to estimate parr populations was collected in 1997. At the same time ISS cooperators agreed to continue to snorkel General Parr Monitoring sites, approximately 20% of previous snorkeling duties.

Both "BY SITE" and "BY HABITAT" population estimates of chinook salmon parr and associated 90% confidence intervals (expressed as a percent of the population estimate) for the six study streams are presented in Table 6. The smallest confidence intervals around parr population estimates occurred in 1994, when parr densities and population estimates were the highest in project history.

Overall, pool habitat supported the largest number of rearing chinook salmon parr (Table 7). The exceptions were usually the result of a group of chinook salmon being observed in a small pocket of "pool habitat" within a section of stream dominated by riffle or run habitat. Higher abundances of parr rearing in habitats other than pool predominantly occurred during years of low parr numbers such as 1995 through 1997.

In general, chinook salmon parr densities were highest in pool habitat for all years presented (Table 8; Appendix B). Lower densities were observed in run habitat and the lowest densities were usually observed in riffle habitat. Densities of chinook salmon were extremely low (< 3.3 fish/100 m^2 in all the streams sampled from 1995 to 1997. No parr were observed in the EFSR, WFYF, and HC in 1996. However, snorkeling effort was reduced in 1996 because no redds were observed in those study stream areas in 1995. The densities of other fish species observed during snorkeling activities are summarized by stream and stratum in Appendix C.

Redd Counts

In most study streams, redd counts were highest in 1993 followed by 1998 (Table 9; Appendix D). However, 1998 counts in BVC, HC, SFSR, and VC were 50-75% lower than 1993 counts. The

number of redds counted in all the study streams was extremely low during 1995 with no redds observed in some upper Salmon River tributaries. Chinook salmon redds were only observed in BVC and SFSR above the IDFG adult weir in 1995. The SFSR and BVC continue to have the greatest number of redds per year. Most populations in our portion of the study show a decline in redd counts through time when examined over a five year interval.

The number of redds counted, live adult chinook salmon observed, and number of carcasses encountered from 1992 to 1998 are presented in Table 9. Carcass data collected from 1998 to 1992 are presented in Tables 10 through 16, respectively. Carcass data should not be used to represent trends in abundance as the redd count data provided should. Dissimilar carcass collection effort was expended between and within years. Carcass survey information should be used to reconstruct brood year success by determining age of adult at return. In addition, mark recovery information from carcasses will be used to help determine adult return rate from various marked groups of fish.

West Fork Yankee Fork Screw Trap

The trap on WFYF was operated throughout the summer for the first time in 1998. Trapping of an entire brood year's migration has not occurred in the past. Parr have generally been too small (<65 mm) to tag until August. As part of the captive rearing/broodstock project, 210 juvenile salmon caught in the screw trap were transferred to Sawtooth Fish Hatchery. There was an estimated 1,334 chinook smolts that emigrated past the trap and an estimated 4,641 presmolts moved past the trap location (Table 17) (see table 17 for confidence intervals and brood years). Numbers of non-target fish caught in the WFYF screw trap are presented in Table 19.

East Fork Salmon River Screw Trap

The number of chinook salmon smolts and presmolts from brood year 1993 was the highest number of fish observed by brood year since the trap was first installed and operated (Table 18). An estimated 8,558 juveniles from brood year 1993 migrated past the trap (see Table 18 for life stage at trapping, and confidence intervals). The majority of presmolt migration occurred in the fall for all brood

years. Sixty percent of brood year 1994, 72 % of brood year 1993, and 93% of brood year 1992 juveniles moved past the trap during the fall. During the fall of both 1993 and 1994, a large number of sculpin were caught. In an attempt to determine if the sculpins were being caught repeatedly, we started fin clipping all sculpin caught starting in the fall of 1993 and ending in the fall of 1994. We clipped half of the right pelvic fin on each sculpin caught and released the fish about 75 m downstream of the screw trap. No recaps were caught during the spring of 1994 and only six recaps were caught during the fall of 1994 (1.2% of the fish clipped). No recaps were caught during the spring or fall of 1995. Numbers of non-target fish caught in the EFSR screw trap are presented in Table 20.

Summer Parr PIT-tagging

Chinook salmon parr were collected with electrofishing gear and PIT-tagged during 1998. Collections and tagging were conducted in cooperation with NMFS (S. Achord) in BVC, VC, and HC. In addition, NMFS tagged parr in the SFSR. Results and analysis from parr tagging in 1998 will be available in published format from NMFS. ISS analysis from summer parr tagging will occur at the project-wide level (ISS 5 year report, *in progress* and future reports).

Parr were tagged in the WFYF and EFSR above the adult weir in 1994. The SBT have not conducted any other summer parr tagging since 1994. The numbers of rearing chinook salmon parr have generally been too low to attempt collecting and PIT-tagging. Few of the chinook salmon parr tagged above the EFSR adult weir in August 1994 were recaptured in the screw trap during the fall of 1994 or spring of 1995. The screw trap started operating the day before the chinook salmon parr were tagged and released in the EFSR. Only three of the 498 chinook salmon parr tagged were recaptured from mid August to late November. Eight of the summer-tagged parr were recaptured during the spring of 1995.

Detections

Forty-three percent of the wild smolts tagged at the EFSR screw trap and released during the spring of 1995 were detected at one of the four facilities (Table 21). The largest percentage of detections occurred at the Lower Granite Dam facility. Detections of the hatchery-reared chinook salmon smolts

were considerably less than the wild smolts during migration year 1995. Approximately 10% of the chinook salmon parr tagged during the summer of 1994 in the EFSR and WFYF were detected at the four detection sites on the Snake and Columbia rivers during migration year 1995 (Table 21 and 22). A slightly greater number of the supplemented EFSR fish (11.8%) were detected than the WFYF supplementation fish (11.1%). Detections were similar to those observed for fish collected and tagged during the fall at the EFSR screw trap (Table 18).

There were differences between 1993, 1994, and 1995 in the time interval during which detections at Lower Granite Dam occurred for chinook salmon PIT-tagged on the EFSR during screw trap efforts. The interval of detection for the chinook salmon smolts migrating during 1993 and 1995 was more protracted than for 1994. Fish moved past Lower Granite Dam earlier in the year during 1995 than 1993. Although the parr in EFSR and WFYF were tagged in the summer as compared to fall or spring fish collected and tagged at the EFSR screw trap, all fish migrated past Lower Granite dam during the same time interval the following spring.

Table 1. List of Idaho Supplementation Studies streams, strata lengths (m), number of sites sampled per stratum, and the predominant channel type present during 1995 (Rosgen 1985). Six tributaries of the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF).

				Number of each habitat type				
Stream	Stratum	Stratum length (m)	Number of sites	Pool	Riffle	Run	Pocket water	Channel type
BVC	3	12,700	19	13	18	12	0	C
	4	11,200	13	10	10	6	0	C
	5	4,000	8	7	7	3	0	C
	6	2,300	7	5	7	2	0	C
	7	5,500	8	6	5	3	0	B
EFSR	1	6,275	14	9	9	6	0	B
	2	5,149	9	8	8	8	0	B
	3	7,521	4	4	4	2	0	B
	4	8,077	5	4	4	5	0	B/C
HC	0	3,000	3	3	2	3	0	B
	1	5,500	8	7	8	4	0	B/C
	2	8,600	11	9	11	6	0	B/C
SFSR	C[a]	2,626	4	3	3	3	0	B
	1	8,695	4	3	4	2	0	B
	2	9,656	17	16	11	10	0	B/C
	3	8,208	10	8	5	5	5	B
VC	1	10,854	6	5	4	4	0	C
	2	14,032	12	12	10	9	0	C
	3	8,308	12	7	9	9	2	C
	5	3,030	0	0	0	0	0	B/C
	6	4,450	4	2	3	2	0	B

WFYF	0	4,141	3	3	2	3	0	B
	1	6,955	13	12	7	8	0	C
	2	4,613	7	5	5	5	0	B

a Curtis Creek is a major tributary of the South Fork Salmon River.

Table 2. Percent of each habitat type found during a 10-pace habitat survey conducted on the following ISS streams: Bear Valley Creek (BVC), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF), during August 1993 and East Fork Salmon River (EFSR) during 1995. The percentage of each habitat type was calculated by stratum and for all strata combined.

		Percent of each habitat type			
Stream	Stratum	Pool	Riffle	Run	Pocket water
BVC	3	36	35	29	0
	4	16	29	55	0
	5	30	19	51	0
	6	37	46	17	0
	7	28	37	35	0
	ALL	30	34	36	0
EFSR	1	27	44	29	0
	2	18	41	41	0
	3	27	57	16	0
	4	24	41	35	0
	ALL	24	48	28	0
HC	0	17	54	29	0
	1	39	43	18	0
	2	24	53	23	0
	ALL	29	49	22	0
SFSR	2	28	35	35	2
	3	12	30	21	37
	c[a]	16	67	17	0
	ALL	23	33	30	14
VC	1	39	38	23	0
	2	24	40	36	0
	3	7	33	58	2
	5	5	42	53	0
	6	5	64	31	0
	ALL	21	36	42	1

WFYF	1	10	58	32	0
	2	30	40	30	0
	ALL	23	46	31	0

Table 3. Chinook salmon releases in the East Fork Salmon River (EFSR) and West Fork Yankee Fork Salmon River (WFYF) from 1986 to 1998.

			Number released[a]					
Stream	Brood year	Release date	Presmolts	Smolt	Fin clip	Number PIT- tagged	Adult collection site[b]	Rearing facility[b]
EFSR	1998	1998	15,240 eyed-eggs from captive reared adults were planted in Jordan-Scotty boxes.					
	1997	8/97	4 captive reared jacks were released to spawn naturally					
	1996	NA	No release from this brood year.					
	1995	NA	No release from this brood year.					
	1994	NA	No release from this brood year.					
	1993	04/03/95	NA	17,595[c]	Left Pelvic	0	EFSR	Sawtooth FH
	1993	03/28/95	NA	31,250	Left Pelvic	499	EFSR	Sawtooth FH
	1992	04/08/94	NA	12,368	Right Pelvic	387	EFSR	Sawtooth FH
	1991	04/20/93	NA	35,172	Left Pelvic	350	Salmon R.	Sawtooth FH
	1990	1992	NA	79,300	Left Pelvic	0	EFSR	Sawtooth FH
	1989	1991	NA	98,300	No clip	0	Sawtooth	Sawtooth FH
	1988	1990	NA	514,600	No clip	0	EFSR	Sawtooth FH
	1987	1989	NA	305,300	No clip	0	EFSR	Sawtooth FH
	1986	1988	NA	249,200	No clip	0	EFSR	Sawtooth FH
	1985	1987	NA	195,100	No clip	0	EFSR	Sawtooth FH
	1984	1986	NA	108,690	No clip	0	EFSR	Sawtooth FH
WFYF	1998	1998	3393 eyed-eggs from captive reared adults were placed in a streamside incubator.					
	1998	8/98	44 Captive reared adults released to spawn naturally to produce BY 98 offspring.					
	1997	8/97	4 captive reared jacks were released to spawn naturally					
	1993	1994	25,025	NA	Adipose	1,000	Salmon R.	Sawtooth FH

a From Idaho Department of Fish and Game annual hatchery reports.
b From Idaho Department of Fish and Game, Fisheries Research, Stocking summary for EFSR and WFYF, 1986-1998.
c These fish were diagnosed with high levels of bacterial kidney disease.

Table 4. Dates the rotary screw trap was installed and removed on the West Fork Yankee Fork Salmon River and East Fork Salmon River. The West Fork Yankee Fork trap location was 25 meters above the mouth, and the East Fork trap location was about 300 meters downstream from the Idaho Department of Fish and Game adult weir.

WEST FORK YANKEE FORK SALMON RIVER

Year	Season	Date installed	Date removed
1998	Spring	25-Mar-98	30-Jun-98
	Summer	1-Jul-98	31-Aug-98
	Fall	1-Sept-98	20-Nov-98

EAST FORK SALMON RIVER

Year	Season	Date installed	Date removed
1997	Spring	N/A	N/A
	Fall	09-Sept-97	10-Oct-97
1996	Spring	04-Mar-96	30-May-96
	Fall	N/A	N/A
1995	Spring	07-Mar-95	31-May-95
	Fall	08-Aug-95	11-Nov-95
1994	Spring	14-Mar-94	27-May-94
	Fall	15-Aug-94	22-Nov-94
1993	Spring	07-Apr-93	21-May-93
	Fall	16-Aug-93	21-Nov-93

Table 5. Average, maximum, and minimum fork lengths (mm) for chinook salmon juveniles PIT tagged on the East Fork Salmon River (EFSR) and West Fork Yankee Fork Salmon River (WFYF) by year and season. N is equal to sample size.

Stream	Tag Year	Brood yr./ Life stage	N	Fork length (mm)		
				Average	Maximum	Minimum
WFYF	1998	96 smolt	78	82	105	71
WFYF	1994	93 parr	171	65	84	55
EFSR	1997	96 presmolt	0	-	-	-
		95 smolt	0	-	-	-
EFSR	1996	94 smolt	150	96	126	76
EFSR	1995	94 presmolt	110	91	108	71
		93 smolt	353	89	122	68
EFSR	1994	93 presmolt	542	80	138	59
		93 parr	498	75	96	56
		92 smolt	21	104	120	95
EFSR	1993	92 presmolt	198	96	108	79
		91 smolt	217	96	126	70

Table 6. Chinook salmon parr population estimates (Pop.), 90% confidence intervals (expressed as a percent of the population estimate), and coeffecient of variation for Idaho Supplementation Studies streams snorkeled from 1992 to 1998. Population estimates were calculated using numbers of fish counted per snorkel site (BY SITE) and numbers of fish counted per habitat unit within each snorkel site (BY HABITAT). Six tributaries of the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NE = no estimate, N/A = not applicable.

	1998[a]	1997			1996			1995			1994			1993			
Stream		Pop.	90% CI	CV	Pop.	90% CI	CV	Pop.	90% CI	CV	Pop.	90% CI	CV	Pop.	90% CI	CV	Pop.
By Site																	
BVC	--	1,236	(78%)	0.46	11	(204%)	0.96	535	(55%)	0.33	25,451	(24%)	0.14	5,259	(66%)	0.38	9,153
EFSR	--	NE			NE			464	(59%)	0.34	9,176	(53%)	0.30	161	(160%)	0.68	NS
HC	--	2,044	(115%)	0.57	0	N/A	N/A	190	(65%)	0.38	39,944	(34%)	0.20	863	(113%)	0.62	16,33
SFSR	--	6,303	(51%)	0.30	6,381	(62%)	0.21	3,796	(46%)	0.27	144,115	(17%)	0.10	12,521	(51%)	0.30	8,820
VC	--	NE			NE			119	(58%)	0.34	136,046	(16%)	0.09	4,126	(50%)	0.28	11,87
WFYF	--	2,180	(106%)	0.60	0	N/A	N/A	4,039	(42%)	0.24	13,465	(33%)	0.19	113	(123%)	0.61	8,285
By Habitat																	
BVC	--	1,405	(100%)	0.34	12	(172%)	0.97	592	(45%)	0.27	26,842	(21%)	0.13	4,621	(69%)	0.40	NS
EFSR	--	NE			NE			539	(67%)	0.39	4,524	(27%)	0.16	34	(105%)	0.54	NS
HC	--	1,807	(199%)	0.68	0	N/A	N/A	105	(76%)	0.45	31,053	(25%)	0.15	513	(116%)	0.68	8,298
SFSR	--	5,696	(55%)	0.23	8,814	(68%)	0.37	3,402	(36%)	0.21	99,435	(18%)	0.11	8,358	(35%)	0.21	5,581
VC	--	NE			NE			145	(73%)	0.44	97,642	(10%)	0.06	2,370	(48%)	0.28	9,590
WFYF	--	1,100	(140%)	0.48	0	N/A	N/A	2,791	(43%)	0.26	11,935	(26%)	0.15	92	(125%)	0.67	NS

a Snorkeling effort was reduced in 1998. As a result, information for this table is not presented.

Table 7. Estimated abundance of chinook salmon parr rearing by habitat type from 1992 to 1998. Six tributaries of the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF).

NA= habitat breakdown not available, NE= no estimate due to low parr densities, NP= habitat type not present in sampled sites, NS= not sampled.

Stream	Pool	Riffle	Run	Pocket water	Total
			1998[a]		
			1997		
BVC	1,011	369	25	NP	1,405
EFSR	NE	NE	NE	NE	NE
HC	1,807	0	0	NP	1,807
SFSR	2,868	333	2,172	323	5,696
VC	NE	NE	NE	NE	NE
WFYF	739	68	294	NP	1,100
			1996		
BVC	0	0	8	NP	8
EFSR	NE	NE	NE	NE	NE
HC	0	0	0	NP	0
SFSR	1,789	4,400	886	893	7,969
VC	NE	NE	NE	NE	NE
WFYF	0	0	0	NP	0
			1995		
BVC	247	113	233	NP	593
EFSR	137	267	135	NP	539
HC	33	34	39	NP	106
SFSR	1,119	858	340	777	3,094
VC	2	27	113	3	145
WFYF	1,149	673	969	NP	2,791
			1994		
BVC	13,479	4,109	9,255	NP	26,843
EFSR	1,997	926	1,601	NP	4,524
HC	22,162	2,439	6,453	NP	31,054
SFSR	37,224	9,673	28,945	23,594	99,436
VC	39,976	16,009	41,183	474	97,642
WFYF	3,825	928	7,182	NP	11,935
			1993		
BVC	1,845	474	2,302	NP	4,621
EFSR	34	0	0	NP	34
HC	474	39	0	NP	513
SFSR	4,777	1,393	1,563	626	8,358
VC	1,001	0	1,369	NA	2,370
WFYF	32	60	0	NP	92
			1992		
BVC	NA	NA	NA	NA	NA
EFSR	NS	NS	NS	NS	NS
HC	5,356	1,447	1,495	NP	8,298
SFSR	2,986	1,111	1,219	265	5,581
VC	2,846	440	6,304	NA	9,590
WFYF	NA	NA	NA	NA	NA

a Snorkeling effort was reduced in 1998. As a result, information for this table is not presented.

Table 8. Densities (fish/100 m^2) of chinook salmon parr observed while snorkeling by habitat type and site from 1992 to 1998. The "By habitat" column is a weighted mean based on the amount of each habitat type present. Percent habitat type present was determined by habitat surveys conducted in 1993 and 1995. Six tributaries of the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NP= habitat type not present in sampled sites, NA= habitat breakdown not available, NS= not sampled.

Stream	Pool	Riffle	Run	Pocket water	By habitat	By Site
			1998[a]			
			1997			
BVC	.71	.23	1.19	NP	0.72	0.38
EFSR	0.2	0.0	.22	NP	0.11	0.1
HC	7.5	0.0	0.0	NP	2.18	2.6
SFSR	6.37	.41	2.77	1.6	2.66	2.44
VC	2.11	.25	.06	NP	0.56	0.38
WFYF	2.29	.09	.79	NP	0.81	1.37
			1996			
BVC	0.0	0.0	0.01	NP	0.003	0.001
EFSR	0.0	0.0	0.0	NP	0.0	0.0
HC	0.0	0.0	0.0	NP	0.0	0.0
SFSR	3.3	2.0	1.0	4.0	2.3	3.2
VC	0.2	0	0.2	0.0	0.13	0.06
WFYF	0.0	0.0	0.0	NP	0.0	0.0
			1995			
BVC	0.3	0.1	0.3	NP	0.2	0.2
EFSR	0.2	0.3	0.1	NP	0.2	0.2
HC	0.2	0.1	0.2	NP	0.1	0.2
SFSR	1.7	1.4	0.6	2.5	1.4	1.3
VC	0.01	0.03	0.1	0.1	0.1	0.1
WFYF	4.8	1.0	2.5	NP	2.2	2.9
			1994			
BVC	12.7	5.7	8.8	NP	8.9	10.1
EFSR	10.8	0.7	2.8	NP	3.7	4.6
HC	91.2	6.8	26.3	NP	35.6	50.3
SFSR	85.2	12.4	46.9	69.1	47.4	59.9
VC	56.6	11.7	28.5	11.1	28.2	34.0
WFYF	19.4	1.7	13.8	NP	9.3	11.9
			1993			
BVC	1.7	0.5	1.0	NP	1.0	1.2
EFSR	0.3	0.0	0.0	NP	0.04	0.1
HC	1.6	0.1	0.0	NP	0.5	0.7
SFSR	10.3	1.9	2.4	3.1	4.1	10.0
VC	1.4	0.0	1.1	NA	0.8	1.0
WFYF	0.1	0.1	0.0	NP	0.1	0.1
			1992			
BVC	NA	NA	NA	NA	NA	3.4
EFSR	NS	NS	NS	NS	NS	NS
	NP[b]fdsd fsdfgsdf					
HC	23.1	6.4	24.8	NP	15.3	21.0

SFSR	5.5	2.9	2.3	0.9	3.0	4.3
VC	6.2	0.5	5.9	NA	4.3	5.1
WFYF	NA	NA	NA	NA	NA	5.0

Table 9. Summary of chinook salmon redds counted, live chinook salmon adults observed, dead chinook salmon carcasses sampled, and redds per kilometer for six tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). Multiple ground counts were conducted between mid August and the beginning of October, 1992 through 1998.

Year	Stream length (km)	Redds counted	Live adults	Carcasses counted	Redds per kilometer
			BVC [a]		
1998	35.7	64	24	19	1.8
1997	35.7	30	27	6	0.8
1996	35.7	12	12	4	0.3
1995	35.7	3	1	0	0.1
1994	35.7	4	1	1	0.1
1993	35.7	138	8	84	3.9
1992	35.7	26	22	10	0.7
			EFSR		
1998	27.0	21	13	2	.7
1997	27.0	0	0	1	0.0
1996	27.0	2	0	0	0.1
1995	27.0	0	0	0	0
1994	27.0	5	3	0	0.2
1993	27.0	19	19	2	0.7
1992	27.0	1	1	1	0.4
			HC		
1998	17.1	10	7	0	0.6
1997	17.1	14	17	8	0.8
1996	17.1	0	0	0	0.0
1995	17.1	0	0	0	0.0
1994	17.1	4	3	0	0.2
1993	17.1	43	57	13	0.4
1992	14.1	3	4	0	0.2

Stream	Stream length (km)	Redds counted	Live adults	Carcasses counted	Redds per kilometer
			SFSR		
1998[b]					
1997	26.6	264	FG	FG	9.9
1996	28.1	78	FG	FG	2.9
1995	26.6	61	FG	FG	2.3
1994	20.4	76	FG	FG	3.7
1993	29.2	694	FG	FG	23.8
1992	20.5	454	FG	FG	22.1
			VC		
1998	33.2	33	19	13	0.9
1997	33.2	5	11	6	0.2
1996	48.7	1	0	1	0.02
1995	48.7	0	0	0	0.0
1994	43.7	4	2	2	0.1
1993	52.3	73	21	39	1.4
1992	33.2	7	15	11	0.2
			WFYF		
1998	11.6	12	4	0	1.03
1997	11.6	6	9	0	0.5
1996	11.6	7	5	1	0.6
1995	11.6	0[c]	1[d]	0	0.0
1994	11.6	9	3	1	0.8
1993	11.6	14	5	0	1.2
1992	11.6	6	6	0	0.5

FG Available from the Idaho Department of Fish and Game. Live adults and carcasses counted for the SFSR should not be compared with similar data from other sites in this table, as IDFG conducted many more ground counts throughout the spawning season.

a Does not include redds from Strata 2.

b All information for 1998 is available from Idaho Department of Fish and Game Fisheries Research.

c Two test digs were observed, but over the course of four redd counts no redds were found.

d One three salt adult salmon of unknown sex was observed on 13-Jul-95 during a practice snorkel session.

Table 10. Number and fork length (cm) of chinook salmon carcasses encountered during redd counts conducted on tributaries of the Salmon River. Multiple ground counts were conducted between mid August and the beginning of October, 1998.

		Carcass fork length (cm)				
			2-ocean		3-ocean	
Stream[a]	Number of carcasses counted	1-ocean	Males	Females	Males	Females
BVC	38[b]				81*	82
					2@90	84
					95	86
					96	87
					2@97	2@88
					2@99	2@89
					4@100	4@90
						1014@92
					102	94
					106	96
					110	97
						3@98
EFSR	2				109	83
HC	0					
VC	13		76		91	74*
					115	80*
						82
						87
						88
						89
						91
						92
						93
						94
WFYF	0					

a BVC = Bear Valley Creek, EFSR = East Fork Salmon River, HC = Herd Creek, VC = Valley Creek, a WFYF = West Fork Yankee Fork Salmon River.

b Includes carcasses found in stratum 2.

* Carcasses were too decayed to obtain fork length. MEHP lengths are reported.

Table 11. Number and fork length (cm) of chinook salmon carcasses encountered during redd counts conducted on tributaries of the Salmon River. Multiple ground counts were conducted between mid August and the beginning of October, 1997.

		Carcass fork length (cm)				
			2-ocean		3-ocean	
Stream[a]	Number of carcasses counted	1-ocean	Males	Females	Males	Females
BVC[b]	10		76	72	97	96
			72	77		89
			69	72		
				69		
EFSR	1			68		
HC	5		70	58		94
				76		96
				70		
				75		
				75		
VC	6		66	73	99	
			74	79		
				74		
WFYF	0					

a BVC = Bear Valley Creek, EFSR = East Fork Salmon River, HC = Herd Creek, VC = Valley Creek, and WFYF = West Fork Yankee Fork Salmon River.

b Does not include carcasses found in stratum 2; totaling 17, lengths available upon request.

Table 12. Number and fork length (cm) of chinook salmon carcasses encountered during redd counts conducted on tributaries of the Salmon River. Multiple ground counts were conducted between mid August and the beginning of October, 1996.

		Carcass fork length (cm)				
			2-ocean		3-ocean	
Stream[a]	Number of carcasses counted	1-ocean	Males	Females	Males	Females
BVC[b]	4		76	71		86
				74		
EFSR[c]	0					
HC	0					
VC	1			72		
WFYF	1	(Not able to identify gender or determine length)				

a BVC = Bear Valley Creek, EFSR = East Fork Salmon River, HC = Herd Creek, VC = Valley Creek, and WFYF = West Fork Yankee Fork Salmon River.

b Does not include carcasses found in stratum 2.

c No fish were collected at IDFG weir, East Fork Salmon River.

Table 13. Number and fork length (cm) of chinook salmon carcasses encountered during redd counts conducted on tributaries of the Salmon River. Multiple ground counts were conducted between mid August and the end of September, 1995.

		Carcass fork length (cm)				
			2-ocean		3-ocean	
Stream[a]	Number of carcasses counted	1-ocean	Males	Females	Males	Females
BVC[b]	0					
EFSR[c]	0					
HC	0					
VC	0					
WFYF	0					

a BVC = Bear Valley Creek, EFSR = East Fork Salmon River, HC = Herd Creek, VC = Valley Creek, and WFYF = West Fork Yankee Fork Salmon River.

b Includes carcasses found in stratum 2.

c No fish were collected at IDFG adult weir, East Fork Salmon River.

Table 14. Number and fork length (cm) of chinook salmon carcasses encountered during redd counts conducted on tributaries of the Salmon River. Multiple ground counts were conducted between mid August and the end of September, 1994.

		Carcass fork length (cm)				
			2-ocean		3-ocean	
Stream[a]	Number of carcasses counted	1-ocean	Males	Females	Males	Females
BVC[b]	7			76	81	2 @ 82
					86	85
					103	90
						EFSR[c]1574
			77		2 @ 88	92
					90	93
					2 @ 95	2 @ 94
					2 @ 97	
					117	
					125	
HC	0					
VC	2				94	89
WFYF	1					81

a BVC = Bear Valley Creek, EFSR = East Fork Salmon River, HC = Herd Creek, VC = Valley Creek, and WFYF = West Fork Yankee Fork Salmon River.

b Includes carcasses found in stratum 2.

c Fish collected at IDFG adult weir, East Fork Salmon River.

Table 15. Number and fork length (cm) of chinook salmon carcasses encountered during redd counts conducted on tributaries of the Salmon River. Multiple ground counts were conducted between mid August and the end of September, 1993.

		Carcass fork length (cm)				
			2-ocean		3-ocean	
Stream[a]	Number of carcasses counted	1-ocean	Males	Females	Males	Females
BVC[b]	84		74	2 @ 75	89	82
			80	81	90	83
					2 @ 91	6 @ 84
					2 @ 93	85
					94	2 @ 87
					95	4 @ 88
					3 @ 96	3 @ 89
					2 @ 97	6 @ 90
					2 @ 98	91
					99	5 @ 92
					100	2 @ 93
					102	3 @ 94
					104	95
					105	96
					107	97
					108	2 @ 98
					110	
EFSR[c]	64	57	2 @ 64	62	81	2 @ 81
		61	2 @ 65	75	2 @ 85	85
			2 @ 67	76	88	86
			68	77	90	5 @ 87
			2 @ 72	78	4 @ 92	2 @ 88
			73	62	93	2 @ 89
			2 @ 76		94	5 @ 90
			78		3 @ 95	3 @ 91
			79		3 @ 96	2 @ 92
						95
						96
HC	13	44			93	83
					96	85
					104	89
					105	90
						2 @ 91
						2 @ 92

Table 15. continued. Number and fork length (cm) of chinook salmon carcasses encountered during redd counts conducted on tributaries of the Salmon River. Multiple ground counts were conducted between mid August and the end of September, 1993.

		Carcass fork length (cm)				
			2-ocean		3-ocean	
Stream[a]	Number of carcasses counted	1-ocean	Males	Females	Males	Females
VC	39	62	72	77	92	80
			73		2 @ 99	2 @ 82
					101	83
					102	85
					105	86
					106	2 @ 87
					108	88
					110	2 @ 90
						91
						92
WFYF	0					

a BVC = Bear Valley Creek, EFSR = East Fork Salmon River, HC = Herd Creek, VC = Valley Creek, and WFYF = West Fork Yankee Fork Salmon River.

b Includes carcasses found in stratum 2.

c Fish collected at IDFG adult weir, East Fork Salmon River.

Table 16. Number and fork length (cm) of chinook salmon carcasses encountered during redd counts conducted on tributaries of the Salmon River. Multiple ground counts were conducted between mid August and the end of September, 1992.

		Carcass fork length (cm)				
			2-ocean		3-ocean	
Stream[a]	Number of carcasses counted	1-ocean	Males	Females	Males	Females
BVC[b]	18	61	2 @ 66	71	86	3 @ 82
			72	76		86
			73			2 @ 87
			74			2 @ 88
			79			
EFSR[c]	65	48	2 @ 63	59	3 @ 82	3 @ 83
		54	2 @ 64	70	83	86
			67	71	84	2 @ 90
			69	75	85	97
			70	76	2 @ 86	
			3 @ 71	78	2 @ 87	
			2 @ 72		2 @ 89	
			2 @ 73		3 @ 80	
			2 @ 74		92	
			2 @ 75		2 @ 97	
			2 @ 76		101	
			3 @ 77			
HC	0					
VC	11		65	64		2 @ 82
			66	76		91
			79	78		93
						94
WFYF	0					

a BVC = Bear Valley Creek, EFSR = East Fork Salmon River, HC = Herd Creek, VC = Valley Creek, and WFYF = West Fork Yankee Fork Salmon River.

b Includes carcasses found in stratum 2.

c Fish collected at IDFG adult weir, East Fork Salmon River.

Table 17. Total number of juvenile chinook salmon caught, total number tagged and released, total number recaptured (recaps) for trap efficiency estimates, and total number of mortalities (Mort.) associated with operation of a screw trap on the West Fork Yankee Fork approximately 20 meters above the mouth during 1998. Trap efficiencies (Trap eff.) and outmigrant population estimates of chinook salmon emigrating (Est. # CH) with associated 95% confidence intervals during each time period are also presented.

		Total number of juvenile chinook salmon						Outmigrant Population Estimate		
Migration Year	Brood year/ lifestage	Trap dates	Caught	Tagged	Recaps	Mort	Trap Eff.	Est. # CH	95% CI lower limit	95% CI upper limit
1999	97 presmolt[a]	7/07-11/20/98	1,354[b]	955	278	1[c]	29.2%	4,641	4,239	5,071
1998	96 smolt	3/26-7/06/98	102	101	7	5[d]	7.8%	1,334	748	2,346

a For the purpose of this table, parr and presmolts from the same brood year were combined.

b 210 of these juveniles were transferred to the Sawtooth Fish Hatchery for captive rearing.

c Mortality was found floating in the trap livebox untagged. Deep scratch marks were apparent on the side of the fish.

d Two mortalities were in the process of being consumed by a predator, two others received an overdose of MS-222, and one untagged mortality was found floating in the trap livebox.

Table 18. Total number of juvenile chinook salmon caught, total number tagged and released, total number recaptured for trap efficiency estimates, total number of mortalities, and total number of juvenile chinook salmon released below the trap untagged during screw trap operation on the East Fork Salmon River from 1993 to 1997. Trap efficiencies and outmigrant population estimates of chinook salmon emigrating with associated 95% confidence intervals during each time period are also presented.

			Total number of juvenile chinook salmon					Trap Efficiency Estimates				Outmigrant	
Migration Year	Brood yr/ lifestage	Trap dates	Caught	Tagged	Recaps	Mort.	Below trap	Trap eff.%	95% CI lower limit	95% CI upper limit	Est. # CH	95% CI lower limit	95% CI upper limit
1998	96 presmolt	9/10-10/22/97	8[b]	0	0	2	1	N/A	N/A	N/A	N/A	N/A	N/A
1997	95 smolt	Trap not installed											
	95 presmolt	Trap not installed											
1996	94 smolt	3/4-5/30/96	153	150[a]	23[a]	2	3	20.7	12.8	31.5	926	609	1,502
	94 presmolt	8/16-11/15/95	113	110	9	0	3	8.2	4.0	15.5	1,381	730	2,813
1995	93 smolt	3/7-5/31/95	367	353	55	1	13	15.0	11.5	19.3	2,444	1,903	3,183
	93 presmolt	8/15-11/22/94	643	542	57	1	100	10.5	8.1	13.5	6,114	4,766	7,920
1994	92 smolt	3/14-5/27/94	21	21	5	0	0	23.8	8.6	48.9	88	43	243
	92 presmolt	8/16-11/21/93	211	198	36	4	9	18.2	13.2	24.5	1,161	863	1,600
1993	91 smolt	4/7-5/21/93	225	217	28	3	5	12.9	8.9	18.3	1,744	1,229	2,537

a In 1996, not all tagged and recap chinook were used in calculating the trap efficiency estimate due to periods when the trap was not operating properly. Eighty-two tagged fish and 17 recaps were used in calculating trap efficiency. Total estimated chinook caught was 192.

b Five juveniles were transferred to Sawtooth Fish Hatchery for captive rearing.

Table 19. Number of fish caught in the screw trap on the West Fork Yankee Fork during 1998. Fish caught include: chinook salmon fry (CF), wild steelhead trout (SH), steelhead fry (SF), bull trout (DV), whitefish (WF), whitefish fry (WFF), cutthroat trout (CT), and sculpin (SC).

Migration Year			Total number of fish caught							
	Season	Dates	CF	SH	SF	DV	WF	WFF	CT	SC
1999	Fall	9/01-11/20/98	0	35	0	18	37	0	1	58
1999	Summer	7/01-8/31/98	130	17	5	4	8	30	3	27
1998	Spring	3/26-6/30/98	158	8	0	10	4	7	0	14

Table 20. Number of fish caught in the screw trap during spring and fall trapping on the East Fork Salmon River from 1993 to 1997. Fish caught include: chinook salmon fry (CF), hatchery steelhead trout (AD), hatchery chinook salmon (HC), wild steelhead trout (SH), bull trout (DV), whitefish (WF), cutthroat trout (CT), and sculpin (SC).

Migration Year			Total number of fish caught							
	Season	Dates	CF	AD	HC	SH	DV	WF	CT	SC
1998	Fall	9/10-10/22/97	8	0	0	0	0	0	0	5
1997	Spring	Trap not installed								
1997	Fall	Trap not installed								
1996	Spring	3/4-5/30/96	0	N/A[a]	0	44	9	19	0	13
1996	Fall	8/15-11/22/95	0	10	0	31	8	31	13	61
1995	Spring	3/14-5/27/95	164	2	12[b]	61	11	3	0	27
1995	Fall	8/15-11/22/94	0	36	0	66	11	5	3	485
1994	Spring	3/14-5/27/94	240	0	43[b]	83	32	9	3	42
1994	Fall	8/16-11/21/93	0	10	0	114	66	86	11	265
1993	Spring	4/7-5/21/93	25	0	451	138	4	3	0	10[c]

a Did not attempt to enumerate hatchery steelhead smolt releases.
b Trap not operational the night hatchery fish were released.
c Started enumerating sculpin on 30 April 1993.

Table 21. Detections at Snake and Columbia River juvenile detection facilities of PIT-tagged wild and hatchery spring chinook salmon juveniles released at or above the IDFG adult weir on the East Fork Salmon River (EFSR) during migration years 1993 to 1997. Wild chinook salmon juveniles were caught with a screw trap, tagged, and released below the IDFG adult weir. Hatchery juveniles were reared and tagged at Sawtooth Fish Hatchery before being released above the IDFG adult weir. Total tagged is the total number of juvenile chinook salmon tagged, N is the number of unique detections by dam, and % is the percent detections by dam.

	Wild				Hatchery	
	Presmolts		Smolts		Smolts	
	N	%	N	%	N	%
	Migration Year 1997[1]					
	Migration Year 1996					
Total tagged	110		150		--	
Lower Granite	7	6.4	33	22.0	--	--
Little Goose	10	9.1	12	8.0	--	--
Lower Monumental	5	4.5	8	5.3	--	--
McNary	0	0.0	4	2.7	--	--
Total detected	22	20.0	57	38.0	--	--
	Migration Year 1995					
Total tagged	542		353		498	
Lower Granite	57	10.5	78	22.1	17	3.4
Little Goose	18	3.3	42	11.9	5	1.0
Lower Monumental	10	1.8	31	8.8	7	1.4
McNary	6	1.1	7	2.0	3	0.6
Total detected	91	16.8	158	44.8	32	6.4
	Migration Year 1994					
Total tagged	198		21		372	
Lower Granite	13	6.6	3	14.3	26	7.0
Little Goose	4	2.0	1	4.8	3	0.8
Lower Monumental	4	2.0	1	4.8	9	2.4
McNary	4	2.0	1	4.8	10	2.7
Total detected	25	12.6	6	28.6	48	12.9
	Migration Year 1993					
Total tagged	--		217		332	
Lower Granite	--	--	47	21.7	20	6.0
Little Goose	--	--	28	12.9	6	1.8
Lower Monumental	--	--	9	4.1	1	0.3
McNary	--	--	11	5.1	8	2.4
Total detected	--	--	95	43.8	35	10.5

[1] No chinook were tagged and released during migration year 1997 on the EFSR.

Table 22. Detections at Snake and Columbia River juvenile detection facilities of PIT-tagged wild spring chinook salmon juveniles released at the West Fork Yankee Fork (WFYF) during migration year 1998. Wild chinook salmon juveniles were caught with a screw trap, tagged, and released in the WFYF. Total tagged is the total number of juvenile chinook salmon tagged, N is the number of unique detections by dam, and % is the percent detections by dam.

	Wild			
	Presmolts		Smolts	
	N	%	N	%
	Migration Year 1998			
Total tagged	--	--	78	
Lower Granite	--	--	16	20.5
Little Goose	--	--	7	9.0
Lower Monumental	--	--	2	2.6
McNary	--	--	2	2.6
Total detected	--	--	27	34.6

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APPENDIX A

Table A1. Standard stratum descriptions used by the Shoshone-Bannock Idaho Supplementation Studies project from 1992 to 1998.

Streams	Stratum Descriptions
Bear Valley Creek	
Stratum 2	Fir Creek confluence upstream to Elk Creek confluence Stratum length = 11,100 m
Stratum 3	Elk Creek confluence upstream to Cache Creek confluence Stratum length = 12,700 m
Stratum 4	Cache Creek confluence upstream to intermittent stream ~1.6 kilometers upstream of FS Road 563 on FS Road 582 Stratum length = 11,200 m
Stratum 5	Intermittent stream upstream to downstream border of mined area Stratum length = 4,000
Stratum 6	Mined area inclusive Stratum length = 2,300 m
Stratum 7	Upstream border of mined area to headwaters Stratum length = 5,500 m
East Fork Salmon River	
Stratum 1	IDFG adult weir upstream to Wickiup Creek confluence Stratum length = 6,275 m
Stratum 2	Wickiup Creek confluence upstream to waterfall ~100 to 200 m upstream of Bowery Creek confluence Stratum length = 5,149
Stratum 3	Waterfall ~100 to 200 m upstream of Bowery Creek confluence upstream to Bowery Guard Station bridge Stratum length = 7,521 m
Stratum 4	Bowery Guard Station bridge upstream to confluence of the South Fork and West Fork of the East Fork Salmon River Stratum length = 8,075
Herd Creek	
Stratum 0	East Pass Creek from confluence of Taylor Creek downstream to confluence of Herd Creek Stratum length = 3,000 m
Stratum 1	Confluence of West Fork and East Fork Herd Creek downstream to Lake Creek confluence Stratum length = 5,500 m

Stratum 2	Lake Creek confluence downstream to the confluence with East Fork Salmon River Stratum length = 8,600 m

South Fork Salmon River

Stratum 1	Headwaters downstream to Rice Creek confluence Stratum length = 8,695 m
Stratum 2	Rice Creek confluence downstream to Warm Lake turnoff (1 km below Bear Creek confluence) Stratum length = 9,656 m
Stratum 3	Warm Lake turnoff (1 km downstream from Bear Creek confluence) to IDFG weir Stratum length = 8,208 m

Curtis Creek

Stratum 1	South Fork Salmon River upstream to first major confluence Stratum length = 2,626 m

Valley Creek

Stratum 1	East Fork Valley Creek confluence downstream to diversion (VC-6) just downstream of FS Road 029 crossing Stratum length = 10,854 m
Stratum 2	Diversion (VC-6) just downstream of FS Road 029 crossing downstream to Stanley Lake Creek bridge Stratum length = 14,032 m
Stratum 3	Stanley Lake Creek bridge downstream to the confluence with Salmon River Stratum length = 8,308 m
Stratum 4	Trap Creek: from confluence with Valley Creek upstream to confluence of Meadow Creek Stratum length = 3,620 m
Stratum 5	Elk Creek: from confluence with Valley Creek upstream to upper end of Elk Meadow Stratum length = 10,500 m
Stratum 6	Stanley Lake Creek: from confluence with Valley Creek upstream to fish barrier on Stanley Lake Stratum length = 4,450 m

West Fork Yankee Fork Salmon River

Stratum 0	Cabin Creek confluence upstream ~4 km Stratum length = 4,141 m
Stratum 1	Downstream end of narrow and deep canyon upstream to confluence of Cabin Creek Stratum length = 6,955 m

Stratum 2	Confluence of Yankee Fork Salmon River upstream to downstream end of narrow and deep canyon Stratum length = 4,613 m

APPENDIX B

Table B1[a]. Overall densities (fish/100m^2) of chinook salmon parr observed while snorkeling by habitat type and stratum during 1997. The "All Habitats" column is a weighted mean based on the amount of each habitat type present. Percent habitat type present was determined by habitat surveys conducted in 1993 and 1995. Six tributaries of the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NS = not snorkeled, NP = habitat type not present

Stream	Stratum	Pool	Riffle	Run	Pocket water	All Habitats
BVC	3	4.24	0.74	0.12	NP	0.00
	4	0.36	0.00	0.10	NP	0.02
	5	0.00	0.00	0.00	NP	0.00
	6	0.00	0.00	0.00	NP	0.00
EFSR	1	0.00	0.00	0.00	NP	0.00
	2	0.00	0.00	NS	NP	0.00
	3	NS	NS	NS	NS	NS
	4	NS	NS	NS	NS	NS
HC	0	NS	NS	NS	NS	NS
	1	NS	NS	NS	NS	NS
	2	7.50	0.00	0.00	NP	0.00
SFSR	2	4.49	0.99	3.21	NP	2.84
	3	0.23	0.00	0.17	1.06	2.56
	C[b]	2.75	0.00	0.57	NP	0.06
VC	1	NS	NS	NS	NS	NS
	2	3.67	0.34	0.06	NP	0.00
	3	0.00	0.25	0.09	NP	0.48
	5	NS	NS	NS	NS	NS
	6[c]	NP	0.00	NP	0.00	NS
WFYF	0	0.00	0.00	0.00	NP	NS
	1	7.01	0.00	0.57	NP	0.00
	2	0.00	NP	0.00	NP	0.00

a Snorkeling effort was reduced in 1998. Therefor, no data is presented.
B Curtis Creek is a major tributary to SFSR.
c Stanley Lake Creek confluence to the outlet of Stanley Lake.

Table B2. Overall densities (fish/100m^2) of chinook salmon parr observed while snorkeling by habitat type and stratum during 1996. The "All Habitats" column is a weighted mean based on the amount of each habitat type present. Percent habitat type present was determined by habitat surveys conducted in 1993 and 1995. Six tributaries of the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NS = not snorkeled, NP = habitat type not present

Stream	Stratum	Pool	Riffle	Run	Pocket water	All Habitats
BVC	3	0.00	0.00	0.00	NP	0.00
	4	0.00	0.00	0.03	NP	0.02
	5	0.00	0.00	NA	NP	0.00
	6	0.00	0.00	0.00	NP	0.00
EFSR	1	0.00	0.00	0.00	NP	0.00
	2	NA	0.00	0.00	NP	0.00
	3	NS	NS	NS	NS	NS
	4	NS	NS	NS	NS	NS
HC	0	NS	NS	NS	NS	NS
	1	0.00	0.00	0.00	NP	0.00
	2	0.00	0.00	NP	NP	0.00
SFSR	2	4.74	3.33	0.97	NP	2.84
	3	1.55	1.21	1.67	4.49	2.56
	C[a]	0.29	0.00	0.07	0.00	0.06
VC	1	0.00	NP	0.00	0.00	0.00
	2	0.00	0.00	0.00	NP	0.00
	3	0.37	0.00	0.77	NP	0.48
	5	NS	NS	NS	NS	NS
	6[b]	NS	NS	NS	NS	NS
WFYF	0	NS	NS	NS	NS	NS
	1	0.00	0.00	0.00	NP	0.00
	2	0.00	NP	0.00	NP	0.00

a Curtis Creek is a major tributary to the South Fork Salmon River.
b Stanley Lake Creek confluence to the outlet of Stanley Lake.

Table B3. Overall densities (fish/100m^2) of chinook salmon parr observed during snorkeling within each stratum by habitat type and site during 1995. The "By habitat" column is a weighted mean based on the amount of each habitat type present. Six tributaries of the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NA = Not available

Stream	Stratum	Pool	Riffle	Run	Pocket water	By habitat	By site
BVC	3	0.3	0.1	0.4	NA	0.3	0.3
	4	0.2	0.1	0.1	NA	0.1	0.1
	5	0.0	0.0	0.0	NA	0.0	0.0
	6	0.2	0.0	0.0	NA	0.1	0.1
	7	0.0	0.0	0.0	NA	0.0	0.0
EFSR	1	0.3	0.9	0.2	NA	0.5	0.5
	2	0.0	0.0	0.0	NA	0.0	0.0
	3	0.0	0.0	0.0	NA	0.0	0.0
	4	0.0	0.0	0.0	NA	0.0	0.0
HC	0	0.0	0.0	0.0	NA	0.0	0.0
	1	0.1	0.0	0.3	NA	0.1	0.1
	2	0.2	0.2	0.2	NA	0.2	0.2
SFSR	2	0.9	0.7	0.1	NA	0.5	0.6
	3	2.8	2.3	1.8	2.5	2.3	2.5
	C[a]	0.2	0.0	0.0	NA	0.0[b]	0.1
VC	1	0.0	0.0	0.0	NA	0.0	0.0
	2	0.0	0.0	0.0	NA	0.0	0.0
	3	0.0[c]	0.1	0.2	0.1	0.1	0.1
	5	0.0	0.0	0.0	NA	0.0	0.0
	6[d]	0.0	0.0	0.0	NA	0.0	0.0
WFYF	0	0.0	0.0	0.0	NA	0.0	0.0
	1	3.9	0.5	1.4	NA	1.1	2.4
	2	6.9	1.6	3.3	NA	3.7	3.6

a Curtis Creek is a major tributary to the South Fork Salmon River.
b Actual density is 0.04 fish/100 m^2.
c Actual density is 0.02 fish/100 m^2.
d Stanley Lake Creek confluence to the outlet of Stanley Lake.

Table B4. Overall densities (fish/100m^2) of chinook salmon parr observed during snorkeling within each stratum by habitat type and site during 1994. The "By habitat" column is a weighted mean based on the amount of each habitat type present. Six tributaries of the the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NA = Not available

Stream	Stratum	Pool	Riffle	Run	Pocket water	By habitat	By site
BVC	3	14.3	4.3	7.6	NA	8.8	9.7
	4	6.1	3.9	5.2	NA	5.0	5.6
	5	11.6	8.7	8.6	NA	9.5	11.0
	6	58.3	19.6	88.9	NA	45.7	52.1
	7	13.1	11.5	0.0	NA	7.8	11.0
EFSR	1	15.9	1.2	5.8	NA	4.4	7.7
	2	7.5	6.0	0.3	NA	1.0	2.1
	3	0.0	0.0	0.0	NA	0.0	0.0
	4	0.0	0.0	0.0	NA	0.0	0.0
HC	0	NA	NA	NA	NA	NA	151.8
	1	112.8	10.5	12.4	NA	35.9	67.1
	2	71.3	5.1	32.5	NA	35.8	39.8
SFSR	2	58.3	13.1	20.4	NA	29.2	38.4
	3	101.9	12.1	66.9	69.1	67.9	71.1
	C[a]	181.3	8.7	156.5	NA	61.4	157.6
VC	1	35.7	3.9	12.4	NA	18.4	22.4
	2	85.9	10.0	50.0	NA	42.4	60.0
	3	47.3	15.7	25.8	11.1	23.5	27.2
	5[b]	35.2	3.1	6.8	NA	6.8	16.8
	6[c]	10.8	0.5	1.6	NA	1.4	5.5
WFYF	0	0.0	0.0	0.0	NA	0.0	0.0
	1	15.6	2.2	22.6	NA	10.1	10.6
	2	25.8	1.1	10.0	NA	11.2	13.1

a Curtis Creek is a major tributary to the South Fork Salmon River.
b Elk Creek confluence to a point 3030 meters upstream.
c Stanley Lake Creek confluence to the outlet of Stanley Lake.

Table B5. Overall densities (fish/100m^2) of chinook salmon parr observed during snorkeling within each stratum by habitat type and site during 1993. The "By habitat" column is a weighted mean based on the amount of each habitat type present. Six tributaries of the the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NA = not available, NS = not surveyed

Stream	Stratum	Pool	Riffle	Run	Pocket water	By habitat	By site
BVC	3	2.2	0.5	0.7	NA	1.2	1.3
	4	1.7	0.0	1.6	NA	1.1	1.7
	5	0.0	0.0	0.0	NA	0.0	0.0
	6	0.0	0.0	0.0	NA	0.0	0.0
	7	0.0	0.0	0.0	NA	0.0	0.0
EFSR	1	0.0	0.0	0.0	NA	0.0	0.0
	2	0.7	0.0	0.0	NA	0.1	0.2
	3	0.0	0.0	0.0	NA	0.0	0.0
	4	0.0	0.0	0.0	NA	0.0	0.0
HC	0	NS	NS	NS	NS	NS	NS
	1	0.0	0.0	0.0	NA	0.0	0.0
	2	2.7	0.1	0.0	NA	0.7	1.1
SFSR	2	8.4	0.5	3.5	NA	3.9	5.2
	3	7.9	3.3	1.5	1.8	2.9	4.4
	C[a]	30.0	0.0	0.4	NA	4.9	13.3
VC	1	0.0	0.0	0.0	0.0	0.0	0.0
	2	3.1	0.0	2.2	NA	1.5	2.1
	3	0.6	0.0	0.8	NA	0.5	0.6
	5	0.0	0.0	0.0	NA	0.0	0.0
	6	NS	NS	NS	NS	NS	NS
WFYF	0	0.0	0.0	0.0	NA	0.0	0.0
	1	0.0	0.0	0.0	NA	0.0	0.0
	2	0.3	0.2	0.0	NA	0.2	0.2

a Curtis Creek is a major tributary to the South Fork Salmon River.

Table B6. Overall densities (fish/100m^2) of chinook salmon parr observed during snorkeling within each stratum by habitat type and site during 1992. The "By habitat" column is a weighted mean based on the amount of each habitat type present. Six tributaries of the the Salmon River were sampled: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). NA = not available, NS = not surveyed

Stream	Stratum	Pool	Riffle	Run	Pocket water	By habitat	By site
BVC	3	NA	NA	NA	NA	NA	0.1
	4	NA	NA	NA	NA	NA	3.4
	5	NA	NA	NA	NA	NA	2.5
	6	NA	NA	NA	NA	NA	15.1
	7	NA	NA	NA	NA	NA	27.3
EFSR	1	NS	NS	NS	NS	NS	NS
	2	NS	NS	NS	NS	NS	NS
	3	NS	NS	NS	NS	NS	NS
	4	NS	NS	NS	NS	NS	NS
HC	0	NS	NS	NS	NS	NS	NS
	1	7.8	0.0	NA	NA	3.0	5.8
	2	33.0	9.9	29.0	NA	19.9	27.8
SFSR	2	3.4	0.2	1.0	NA	1.4	2.2
	3	9.4	4.5	3.5	0.9	3.5	6.7
	C[a]	NA	NA	NA	NA	NA	0.7
VC	1	0.0	0.0	0.0	0.0	0.0	0.0
	2	7.0	1.1	7.5	NA	4.8	6.1
	3	7.8	0.4	6.1	NA	4.3	5.7
	5	NS	NS	NS	NS	NS	NS
	6	NS	NS	NS	NS	NS	NS
WFYF	0	NS	NS	NS	NS	NS	NS
	1	15.6	2.2	22.6	NA	10.1	10.6
	2	25.8	1.1	10.0	NA	11.2	13.1

a Curtis Creek is a major tributary to the South Fork Salmon River.

APPENDIX C

Table C1. Summary of fish densities (fish/100 m^2) for nine species encountered during snorkeling activities conducted in 1997 on six tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). In 1998, snorkeling activities were reduced. Fish densities are presented by species and size groups (mm). NS = not surveyed

		Steelhead trout				Cutthroat trout			Suckers	
Stream	Stratum	<80	80-160	160-230	>230	<80	80-160	>160	<80	80-160
BVC	3	1.125	0.22	0.11	0.00	0.040	0.00	0.30	0.00	0.00
	4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EFSR	1	0.00	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3	NS	NS	NS	NS	NS	NS	NS	NS	NS
	4	NS	NS	NS	NS	NS	NS	NS	NS	NS
HC	0	NS	NS	NS	NS	NS	NS	NS	NS	NS
	1	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2	0.00	0.43	0.21	0.00	0.00	0.43	0.32	0.00	0.00
SFSR	1	0.210	0.21	0.43	0.00	0.00	0.00	0.00	0.00	0.00
	2	0.24	0.00	0.00	0.01	0.00	0.00	0.00	0.00	0.00
	3	0.03	0.07	0.02	0.00	0.00	0.00	0.00	0.00	0.00
	C[a]	1.13	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VC	1	NS	NS	NS	NS	NS	NS	NS	NS	NS
	2	0.680	0.00	0.08	0.04	0.00	0.00	0.00	0.00	0.04
	3	0.23	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6	0.11	0.00	0.00	0.00	0.00	0.79	0.11	0.00	0.00
WFYF	0	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table C1 continued.

		Bull trout			Whitefish					
Stream	Stratum	<90	90-170	>170	<90	90-170	>170	Dace[b]	Sculpin[b]	R
BVC	3	0.00	0.00	0.00	1.71	0.18	0.37	0.00	P	
	4	0.00	0.00	0.00	0.62	0.00	0.06	0.00	P	
	5	0.54	0.00	0.00	0.15	0.08	0.00	0.00	0.00	
	6	0.00	0.00	0.22	2.31	0.11	0.00	0.00	0.00	
	7	0.05	0.11	0.00	0.16	0.00	0.00	0.00	0.00	

EFSR	1	0.00	0.00	0.00	0.00	0.00	0.78	0.00	0.00
	2	0.00	0.00	0.00	0.00	0.00	0.35	0.00	0.00
	3	NS	NS	NS	NS	NS	NS	NS	NS
	4NS	NS	NS	NS	NS	NS	NS	NS	NS
HC	0	NS	NS	NS	NS	NS	NS	NS	NS
	1	NS	NS	NS	NS	NS	NS	NS	NS
	2	0.00	0.00	0.00	0.97	0.00	0.21	0.00	0.00
SFSR	1	0.00	0.00	0.11	0.00	0.00	0.00	0.00	P
	2	0.00	0.00	0.02	0.00	0.01	0.06	0.00	P
	3	0.00	0.00	0.07	0.00	0.00	0.02	0.00	0.00
	C[b]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	P
VC	1	NS	NS	NS	NS	NS	NS	NS	NS
	2	0.00	0.00	0.00	0.87	0.00	0.04	0.00	0.00
	3	0.12	0.00	0.00	0.06	0.00	0.29	0.00	0.00
	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	P
WFYF	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	P
	2	0.00	0.00	0.00	0.00	0.00	0.45	0.00	0.00

a Curtis Creek is a major tributary to the South Fork Salmon River.

b P indicates this genus was observed, 0.00 indicates not observed.

Table C2. Summary of fish densities (fish/100 m^2) for nine species encountered during snorkeling activities conducted in 1996 on six tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). Fish denisities are presented by species and size groups (mm). NS = not surveyed

		Steelhead trout				Cutthroat trout			Suckers	
Stream	Stratum	<80	80-160	160-230	>230	<80	80-160	>160	<80	80-160
BVC	3	0.05	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4	0.00	0.05	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EFSR	1	0.00	0.05	0.15	0.05	0.00	0.00	0.00	0.00	0.00
	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3	NS	NS	NS	NS	NS	NS	NS	NS	NS
	4	NS	NS	NS	NS	NS	NS	NS	NS	NS
HC	0	NS	NS	NS	NS	NS	NS	NS	NS	NS
	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2	0.00	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00
SFSR	1	0.00	1.11	0.13	0.00	0.00	0.00	0.07	0.00	0.00
	2	0.03	0.11	0.01	0.00	0.00	0.00	0.00	0.00	0.00
	3	0.04	0.10	0.05	0.00	0.00	0.00	0.00	0.00	0.00
	C[a]	0.06	0.18	0.06	0.00	0.06	0.00	0.00	0.00	0.00
VC	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3	0.00	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6	NS	NS	NS	NS	NS	NS	NS	NS	NS
WFYF	0	NS	NS	NS	NS	NS	NS	NS	NS	NS
	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table C2 continued.

		Bull trout			Whitefish				
Stream	Stratum	<90	90-170	>170	<90	90-170	>170	Dace[b]	Sculpin[b]
BVC	3	0.00	0.00	0.00	0.25	0.00	0.18	0.00	P
	4	0.00	0.00	0.00	0.89	0.11	0.14	0.00	P
	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	P
	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00
EFSR	1	0.00	0.00	0.00	0.00	0.00	0.36	P	P

	2	0.00	0.00	0.00	0.00	0.00	0.21	0.00	0.00
	3	NS	NS	NS	NS	NS	NS	NS	NS
	4NS	NS	NS	NS	NS	NS	NS	NS	NS
HC	0	NA	NS	NS	NS	NS	NS	NS	NS
	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2	0.00	0.12	0.12	0.00	0.00	0.35	0.00	0.00
SFSR	1	0.00	0.07	0.00	0.00	0.00	0.20	0.00	0.00
	2	0.00	0.00	0.00	0.66	0.01	0.03	0.00	P
	3	0.00	0.00	0.00	0.34	0.01	0.03	P	P
	C[b]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	P
VC	1	0.00	0.00	0.00	0.12	0.00	0.00	0.00	P
	2	0.00	0.00	0.00	0.03	0.00	0.29	0.00	P
	3	0.00	0.00	0.00	0.15	0.31	0.36	P	P
	6	NS	NS	NS	NS	NS	NS	NS	NS
WFYF	0	NS	NS	NS	NS	NS	NS	NS	NS
	1	0.00	0.00	0.00	0.00	0.13	0.83	0.00	0.00
	2	0.00	0.00	0.00	0.00	0.00	0.47	0.00	0.00

a Curtis Creek is a major tributary to the South Fork Salmon River.

b P indicates this genus was observed, 0.00 indicates not observed.

Table C3. Summary of fish densities (fish/100 m^2) for nine species encountered during snorkeling activities conducted in 1995 on six tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). Fish denisities are presented by species and size groups (mm).

		Steelhead trout				Cutthroat trout			Suckers		
Stream	Stratum	<80	80-160	160-230	>230	<80	80-160	>160	<80	80-160	>
BVC	3	0.64	0.01	0.00	0.01	0.00	0.02	0.03	0.00	0.00	
	4	0.01	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00	
	5	0.00	0.00	0.00	0.00	0.00	0.05	0.00	0.00	0.00	
	6	0.00	0.00	0.18	0.00	0.00	0.00	0.00	0.00	0.00	
	7	0.00	0.17	0.00	0.00	0.17	0.00	0.00	0.00	0.00	
EFSR	1	0.01	0.20	0.18	0.09	0.00	0.00	0.02	0.00	0.00	
	2	0.00	0.22	0.10	0.01	0.00	0.01	0.00	0.00	0.00	
	3	0.00	0.10	0.03	0.03	0.00	0.00	0.00	0.00	0.00	
	4	0.00	0.07	0.07	0.04	0.00	0.00	0.00	0.00	0.00	
HC	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	1	0.05	0.09	0.23	0.09	0.00	0.00	0.00	0.00	0.00	
	2	0.00	0.58	0.32	0.00	0.00	0.00	0.00	0.00	0.00	
SFSR	1	0.10	1.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

	2	0.18	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3	0.54	0.13	0.02	0.02	0.00	0.00	0.00	0.00	0.00
	C[a]	0.68	0.34	0.14	0.00	0.00	0.00	0.00	0.00	0.00
VC	1	0.00	0.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2	0.04	0.00	0.03	0.01	0.00	0.00	0.00	0.00	0.00
	3	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00
	6	0.07	0.43	0.14	0.00	0.00	0.00	0.00	0.00	0.07
WFYF	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1	0.01	0.06	0.04	0.00	0.00	0.00	0.00	0.00	0.00
	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 3 continued

		Bull trout			Whitefish					
Stream	Stratum	<90	90-170	>170	<90	90-170	>170	Dace[b]	Sculpin[b]	R
BVC	3	0.00	0.00	0.00	4.64	0.02	0.74	P	P	
	4	0.00	0.00	0.00	0.96	0.00	0.19	0.00	P	
	5	0.00	0.00	0.00	0.05	0.00	0.15	0.00	P	
	6	0.00	0.09	0.00	0.09	0.00	0.00	0.00	0.00	
	7	0.00	0.09	0.09	0.00	0.00	0.00	0.00	P	
EFSR	1	0.00	0.00	0.03	0.01	0.00	0.40	0.00	P	
	2	0.00	0.00	0.01	0.00	0.00	0.45	0.00	P	
	3	0.00	0.00	0.00	0.00	0.00	0.33	0.00	P	
	4	0.00	0.00	0.00	0.00	0.00	0.11	0.00	P	
HC	0	0.00	0.00	0.00	0.00	0.00	0.34	0.00	0.00	
	1	0.00	0.00	0.09	0.00	0.00	0.09	0.00	P	
	2	0.00	0.00	0.00	0.03	0.00	0.03	0.00	P	
SFSR	1	0.00	0.00	0.00	0.00	0.19	0.78	P	P	
	2	0.00	0.00	0.00	0.13	0.00	0.04	P	P	
	3	0.00	0.00	0.01	0.07	0.00	0.11	P	0.00	
	C[b]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	P	
VC	1	0.00	0.00	0.00	0.05	0.00	0.20	0.00	P	
	2	0.00	0.00	0.00	0.36	0.00	0.84	P	P	
	3	0.00	0.00	0.01	0.48	0.07	0.53	P	P	
	6	0.00	0.00	0.00	0.00	0.07	0.00	P	P	
WFYF	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	P	
	1	0.00	0.00	0.00	0.04	0.00	0.47	0.00	P	
	2	0.00	0.00	0.02	0.12	0.23	0.28	0.00	P	

a Curtis Creek is a major tributary to the South Fork Salmon River

b P indicates this genus was observed, 0.00 indicates not observed.

Table C4. Summary of fish densities (fish/100 m^2) for nine species encountered during snorkeling activities conducted in 1994 on six tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). Fish denisities are presented by species and size groups (mm).

		Steelhead trout				Cutthroat trout			Suckers		
Stream	Stratum	<80	80-160	160-230	>230	<80	80-160	>160	<80	80-160	>
BVC	3	0.17	0.13	0.01	0.00	0.04	0.00	0.01	0.00	0.00	
	4	0.15	0.27	0.01	0.00	0.00	0.00	0.00	0.00	0.00	
	5	0.13	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	6	0.43	1.00	0.00	0.00	0.00	0.00	0.07	0.00	0.00	
	7	0.00	0.00	0.00	0.00	0.16	0.48	0.16	0.00	0.00	
EFSR	1	0.16	0.26	0.13	0.07	0.00	0.00	0.03	0.00	0.00	
	2	0.53	0.38	0.26	0.13	0.00	0.00	0.01	0.00	0.00	
	3	0.07	0.24	0.07	0.03	0.00	0.00	0.00	0.00	0.00	
	4	0.00	0.46	0.20	0.13	0.00	0.00	0.00	0.00	0.00	
HC	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	1	0.80	0.43	0.06	0.00	0.00	0.00	0.00	0.00	0.00	
	2	0.12	1.02	0.27	0.00	0.00	0.00	0.00	0.00	0.00	
SFSR	1	7.82	0.42	0.00	0.07	0.00	0.00	0.00	0.00	0.00	
	2	1.90	0.09	0.00	0.00	0.00	0.00	0.00	0.03	0.00	
	3	2.68	1.10	0.01	0.16	0.00	0.00	0.00	0.06	0.01	
	C[a]	3.75	0.88	0.00	0.00	0.00	0.00	0.11	0.00	0.00	
VC	1	0.00	0.12	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	2	0.25	1.43	0.05	0.01	0.00	0.00	0.00	0.05	0.04	
	3	0.36	0.20	0.04	0.00	0.00	0.00	0.00	0.37	0.03	
	5	0.22	0.66	0.07	0.00	0.00	0.00	0.00	0.00	0.00	
	6	0.21	0.70	0.07	0.00	0.00	0.00	0.00	0.14	0.21	
	7	0.00	0.28	0.00	0.00	0.00	0.00	0.00	0.28	0.00	
WFYF	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	1	0.29	0.44	0.11	0.00	0.00	0.00	0.00	0.00	0.00	
	2	0.61	0.18	0.02	0.02	0.00	0.00	0.00	0.00	0.00	

Table 4 continued

		Bull trout			Whitefish					
Stream	Stratum	<90	90-170	>170	<90	90-170	>170	Dace[b]	Sculpin[b]	
BVC	3	0.00	0.00	0.01	15.0	0.00	0.64	P	P	
	4	0.00	0.00	0.01	4.27	0.00	0.01	P	P	
	5	0.00	0.00	0.00	1.85	0.00	0.00	0.00	P	

	6	0.00	0.00	0.00	6.73	0.00	0.00	0.00	P
	7	0.48	0.48	0.00	0.00	0.00	0.00	0.00	0.00
EFSR	1	0.01	0.00	0.00	0.07	0.00	0.59	0.00	P
	2	0.00	0.00	0.01	0.00	0.00	0.98	0.00	P
	3	0.00	0.00	0.03	0.00	0.00	0.21	0.00	P
	4	0.00	0.00	0.07	0.00	0.00	0.53	0.00	P
HC	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	P
	1	0.00	0.06	0.06	0.00	0.12	0.18	0.00	P
	2	0.00	0.00	0.04	1.72	0.16	0.63	0.00	P
SFSR	1	0.00	0.00	0.00	0.07	0.00	0.42	0.00	P
	2	0.01	0.01	0.00	0.37	0.00	0.00	P	P
	3	0.00	0.00	0.00	1.86	0.00	0.45	P	P
	C[a]	0.00	0.00	0.00	0.17	0.00	0.00	0.00	P
VC	1	0.00	0.00	0.03	1.06	0.00	0.00	0.00	P
	2	0.00	0.03	0.04	0.56	0.01	1.16	P	P
	3	0.01	0.00	0.00	0.94	0.08	0.25	P	P
	5	0.00	0.00	0.00	0.07	0.00	0.15	P	P
	6	0.00	0.00	0.00	0.00	0.00	0.00	P	P
	7	0.00	0.00	0.00	0.28	0.28	0.00	P	0.00
WFYF	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1	0.02	0.00	0.04	0.02	0.00	0.17	0.00	P
	2	0.00	0.00	0.00	0.22	0.00	0.14	0.00	P

a Curtis Creek is a major tributary to the South Fork Salmon River.

b P indicates this genus was observed, 0.00 indicates not observed.

Table C5. Summary of fish densities (fish/100 m^2) for nine species encountered during snorkeling activities conducted in 1993 on six tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). Fish denisities are presented by species and size groups (mm).

		Steelhead trout				Cutthroat trout			Suckers		
Stream	Stratum	<80	80-160	160-230	>230	<80	80-160	>160	<80	80-160	>
BVC	3	0.07	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	
	4	0.09	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	6	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	7	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
EFSR	1	0.09	0.11	0.03	0.13	0.00	0.00	0.00	0.00	0.00	
	2	0.06	0.29	0.14	0.05	0.00	0.38	0.23	0.00	0.00	
	3	0.04	0.24	0.36	0.20	0.08	0.64	0.52	0.00	0.00	

	4	0.00	0.18	0.18	0.12	0.00	0.06	0.00	0.00	0.00
HC	1	0.00	0.40	0.00	0.32	0.00	0.00	0.00	0.00	0.00
	2	0.26	1.79	0.39	0.00	0.00	0.09	0.00	0.00	0.00
SFSR	2	0.07	0.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	3	0.08	0.05	0.04	0.04	0.00	0.00	0.00	0.00	0.00
	C[a]	0.24	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VC	1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	2	0.62	0.59	0.05	0.00	0.00	0.00	0.00	0.07	0.00
	3	0.49	0.10	0.01	0.00	0.00	0.00	0.00	0.16	0.05
	6	0.48	2.09	1.13	0.00	0.00	0.00	0.00	0.16	0.32
WFYF	0	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	1	0.08	0.03	0.00	0.05	0.00	0.16	0.03	0.00	0.00
	2	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 5 continued

		Bull trout			Whitefish					
Stream	Stratum	<90	90-170	>170	<90	90-170	>170	Dace[b]	Sculpin[b]	
BVC	3	0.00	0.00	0.00	1.36	0.00	0.43	0.00	P	
	4	0.00	0.00	0.00	3.06	0.00	0.02	0.00	P	
	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	6	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
	7	0.00	0.52	0.00	0.00	0.00	0.00	0.00	P	
EFSR	1	0.00	0.00	0.00	0.02	0.00	0.29	0.00	P	
	2	0.00	0.00	0.00	0.00	0.00	0.32	0.00	P	
	3	0.00	0.00	0.00	0.00	0.04	0.20	P	P	
	4	0.00	0.00	0.24	0.00	0.00	0.24	0.00	P	
HC	1	0.00	0.08	0.00	0.00	0.00	0.00	0.00	P	
	2	0.00	0.04	0.00	0.00	0.13	0.48	0.00	P	
SFSR	2	0.00	0.00	0.00	0.03	0.01	0.00	P	P	
	3	0.00	0.00	0.00	0.30	0.01	0.11	P	P	
	C[a]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
VC	1	0.00	0.09	0.00	0.26	0.00	0.00	0.00	P	
	2	0.00	0.00	0.00	0.43	0.07	1.03	P	P	
	3	0.00	0.00	0.00	0.63	0.02	0.77	P	P	
	6	0.00	0.00	0.00	0.00	0.00	0.00	P	0.00	
WFYF	0	0.00	0.00	0.21	0.00	0.00	0.00	0.00	0.00	
	1	0.00	0.00	0.00	0.14	0.00	0.30	0.00	P	

	2	0.00	0.00	0.00	0.00	0.00	0.82	0.00	P

a Curtis Creek is a major tributary to the South Fork Salmon River.

b P indicates this genus was observed, 0.00 indicates not observed.

Table C6. Summary of fish densities (fish/100 m^2) for nine species encountered during snorkeling activities conducted in 1992 on five tributaries[a] of the Salmon River: Bear Valley Creek (BVC), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). Fish denisities are presented by species and size groups (mm).

		Steelhead trout				Cutthroat trout			Suckers	
Stream	Stratum	<80	80-160	160-230	>230	<80	80-160	>160	<80	80-160
BVC	3	0.05	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	4	0.64	1.00	0.03	0.03	0.00	0.00	0.03	0.00	0.00
	5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	6	0.00	0.09	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	7	0.00	0.34	0.34	0.34	0.00	0.00	0.00	0.00	0.00
HC	1	0.00	3.52	0.21	0.62	0.00	0.00	0.21	0.00	0.00
	2	3.67	3.77	1.79	0.47	0.00	0.19	0.09	0.00	0.00
SFSR	2	5.74	0.63	0.00	0.00	0.00	0.02	0.00	0.00	0.00
	3	4.84	0.30	0.02	0.00	0.00	0.00	0.00	0.00	0.00
	C[b]	7.32	0.11	0.00	0.00	0.11	0.00	0.00	0.00	0.00
VC	1	0.00	0.00	0.07	0.00	0.00	0.00	0.00	0.00	0.00
	2	1.74	0.05	0.05	0.00	0.00	0.00	0.00	0.00	0.00
	3	0.77	0.25	0.09	0.59	0.00	0.00	0.00	0.00	0.00
WFYF	1	0.00	0.75	0.28	0.00	0.00	0.05	0.05	0.00	0.00
	2	0.00	0.36	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 6 continued

	Bull trout	Whitefish

Stream	Stratum	<90	90-170	>170	<90	90-170	>170	Dace[c]	Sculpin[c]
BVC	3	0.00	0.00	0.00	0.64	0.00	0.02	P	P
	4	0.00	0.00	0.00	2.030	0.00	0.00	0.00	P
	5	0.00	0.00	0.00	17.1	0.17	0.00	0.00	0.00
	6	0.00	0.18	0.09	31.5	3.50	0.00	0.00	P
	7	0.00	0.34	0.00	0.00	0.67	0.00	0.00	0.00
HC	1	0.21	0.00	0.41	0.00	0.00	0.00	0.00	0.00
	2	0.00	0.00	0.00	0.38	1.04	0.57	0.00	P
SFSR	2	0.00	0.00	0.00	0.02	0.00	0.13	0.00	P
	3	0.00	0.00	0.00	0.44	0.07	0.63	0.00	P
	C[a]	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
VC	1	0.00	0.00	0.00	2.59	0.00	0.00	0.00	P
	2	0.00	0.00	0.03	3.34	0.00	1.95	0.00	0.00
	3	0.00	0.00	0.00	1.48	0.12	0.21	0.00	P
WFYF	1	0.00	0.05	0.00	0.05	0.00	0.37	0.00	P
	2	0.00	0.00	0.00	0.05	0.00	0.25	0.00	0.00

a East Fork Salmon River was not sampled in 1992.

b Curtis Creek is a major tributary to the South Fork Salmon River.

c P indicates this genus was observed, 0.00 indicates not observed.

APPENDIX D

Table D1. Summary of chinook salmon redds counted, live chinook salmon adults observed, dead chinook salmon carcasses sampled, and redds per kilometer by stratum for six tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). Multiple ground counts were conducted between mid August and the beginning of October, 1998. NS = not surveyed.

Stream	Stratum	Stratum length (km)	Redds counted	Live adults	Carcasses counted	Redds per kilometer
BVC	2[a]	--	25	44	19	--
	3	12.7	39	15	11	3.1
411.217651.5						
	5	4.0	4	1	1	1.0
	6	2.3	3	2	2	1.3
	7	5.5	1	0	0	0.2
	All	35.7	64	24	19	1.8
EFSR	1	6.3	15	5	1	2.4
	2	5.1	6	8	1	1.2
	3	7.5	0	0	0	0.0
48.10000.0						
	All	27.0	21	13	2	0.8
HC	0	3.0	NS	NS	NS	NS
	1	5.5	3	3	0	0.5
	2	8.6	7	4	0	0.8
	All	17.1	10	7	0	0.6
SFSR[b]	–	–	–	–	–	–
VC	1	10.9	0	0	0	0.0
	2	14.0	21	13	8	1.5
	3	8.3	12	6	5	1.4
	4	3.6	NS	NS	NS	NS
	5	10.5	NS	NS	NS	NS
	6	4.4	NS	NS	NS	NS
	All	33.2	33	19	13	0.9
WFYF[c]	1	7.0	8	3	0	1.1
	2	4.6	4	1	0	0.9
	All	11.6	12	4	0	1.0

a Strata 2 in BVC is presented here because data were collected in coordination with SRHE. Stratum length and redds per km are not presented because Strata 2 is not within ISS study section of BVC. Stratum 2 is not included in the summary row.

b All information for 1998 is available from Idaho Department of Fish and Game, Fisheries Research.

c Captive reared chinook salmon adults were released for natural spawning in WFYF in 1998.

Table D2. Summary of chinook salmon redds counted, live chinook salmon adults observed, dead chinook salmon carcasses sampled, and redds per kilometer by stratum for six tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). Multiple ground counts were conducted between mid August and the beginning of October, 1997. NS = not surveyed.

Stream	Stratum	Stratum length (km)	Redds counted	Live adults	Carcasses counted	Redds per kilometer
BVC	3	12.7	16	18	4	1.3
	4	11.2	8	6	2	0.7
	5	4.0	4	1	0	1.0
	6	2.3	1	0	0	0.4
	7	5.5	1	2	0	0.2
	All	35.7	30	27	6	0.8
EFSR[a]	1	6.3	0	0	1	0.0
	2	5.1	0	0	0	0.0
	3	7.5	0	0	0	0.0
	4	8.1	0	0	0	0.0
	All	27.0	0	0	1	0.0
HC	0	3.0	0	0	0	0.0
	1	5.5	6	8	3	1.1
	2	8.6	8	9	5	0.9
	All	17.1	14	17	8	0.8
SFSR	1	8.7	19	FG[b]	FG	2.2
	2	9.7	112	FG	FG	11.5
	3	8.2	133	FG	FG	16.2
	C[c]	1.5	NS	NS	NS	NS
	All	26.6	264	FG	FG	9.9
VC	1	10.9	1	2	2	0.1
	2	14.0	2	5	3	0.1
	3	8.3	2	4	1	0.2
	4	3.6	NS	NS	NS	NS
	5	10.5	NS	NS	NS	NS
	6	4.4	NS	NS	NS	NS
	All	33.2	5	11	6	0.2
WFYF[d] 24.66901.3	1	7.0	0	0	0	0.0
	All	11.6	6	9	0	0.5

a Four captive reared jack chinook salmon were released above the IDFG weir in 1997.
b FG = Live adult counts and carcass data are available from IDFG.
c Curtis Creek is a major tributary to the SFSR.
d Four captive reared jack chinook salmon were released in the WFYF in 1997.

Table D3. Summary of chinook salmon redds counted, live chinook salmon adults observed, dead chinook salmon carcasses sampled, and redds per kilometer by stratum for six tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). Multiple ground counts were conducted between mid August and the beginning of October, 1996.

Stream	Stratum	Stratum length (km)	Redds counted	Live adults	Carcasses counted	Redds per kilometer
BVC	3	12.7	12	12	3	0.9
	4	11.2	0	0	1	0.0
	5	4.0	0	0	0	0.0
	6	2.3	0	0	0	0.0
	7	5.5	0	0	0	0.0
	All	35.7	12	12	4	0.3
EFSR	1	6.3	2	0	0	0.3
	2	5.1	0	0	0	0.0
	3	7.5	0	0	0	0.0
	4	8.1	0	0	0	0.0
	All	27.0	2	0	0	0.07
HC	0	3.0	0	0	0	0.0
	1	5.5	0	0	0	0.0
	2	8.6	0	0	0	0.0
	All	17.1	0	0	0	0.0
SFSR	1	8.7	3	FG[a]	FG	0.3
	2	9.7	49	FG	FG	5.1
	3	8.2	26	FG	FG	3.2
	C[b]	1.5	0	0	0	0.0
	All	28.1	78	FG	FG	2.8
VC	1	10.9	1	0	1	0.09
	2	14.0	0	0	0	0.0
	3	8.3	0	0	0	0.0
	Mainstem	33.2	0	0	0	0.0
	5	10.5	NS[c]	NS	NS	NS
	6	5.0	NS	NS	NS	NS
	All	52.3	1	0	1	0.02
WFYF 24.62000.4	1	7.0	5	5	1	0.7
	All	11.6	7	5	1	0.6

a FG = Live adult counts and carcass data are available from IDFG.

b Curtis Creek is a major tributary to the SFSR.

c NS = Not surveyed

Table D4. Summary of chinook salmon redds counted, live chinook salmon adults observed, dead chinook salmon carcasses sampled, and redds per kilometer by stratum for six tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). Multiple ground counts were conducted between mid August and the beginning of October, 1995.

Stream	Stratum	Stratum length (km)	Redds counted	Live adults	Carcasses counted	Redds per kilometer
BVC	3	12.7	3	1	0	0.2
	4	11.2	0	0	0	0.0
	5	4.0	0	0	0	0.0
	6	2.3	0	0	0	0.0
	7	5.5	0	0	0	0.0
	All	35.7	3	1	0	0.1
EFSR	1	6.3	0	0	0	0.0
	2	5.1	0	0	0	0.0
	3	7.5	0	0	0	0.0
	4	8.1	0	0	0	0.0
	All	27.0	0	0	0	0.0
HC	0	3.0	0	0	0	0.0
	1	5.5	0	0	0	0.0
	2	8.6	0	0	0	0.0
	All	17.1	0	0	0	0.0
SFSR	1	8.7	2	FG[a]	FG	0.2
	2	9.7	49	FG	FG	5.1
	3	8.2	10	FG	FG	1.2
	C[b]	NS	NS	NS	NS	NS
	All	26.6	61	FG	FG	2.3
VC	1	10.9	0	0	0	0.0
	2	14.0	0	0	0	0.0
	3	8.3	0	0	0	0.0
	Mainstem	33.2	0	0	0	0.0
	5	10.5	0	0	0	0.0
	6	5.0	0	0	0	0.0
	All	52.3	0	0	0	0.0
WFYF	1	7.0	0[c]	0	0	0.0
	2	4.6	0	1[d]	0	0.0
	All	11.6	0	0	0	0.0

a FG = Live adult counts and carcass data are available from IDFG.
b Curtis Creek, a major tributary to the SFSR, was not surveyed in 1995.
c Two test digs were observed, but over the course of four redd counts no redds were found.
d One 3-salt adult salmon of unknown sex was observed on 13-Jul-95 during a practice snorkel session.

Table D5. Summary of chinook salmon redds counted, live chinook salmon adults observed, dead chinook salmon carcasses sampled, and redds per kilometer by stratum for six tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). Multiple ground counts were conducted between mid August and the end of September, 1994.

Stream	Stratum	Stratum length (km)	Redds counted	Live adults	Carcasses counted	Redds per kilometer
BVC	3	12.7	3	1	1	0.2
	4	11.2	1	0	0	0.1
	5	4.0	0	0	0	0.0
	6	2.3	0	0	0	0.0
	7	5.5	0	0	0	0.0
	All	35.7	4	1	1	0.1
EFSR	1	6.3	5	3	0	0.8
	2	5.1	0	0	0	0.0
	3	7.5	0	0	0	0.0
	4	8.1	0	0	0	0.0
	All	27.0	5	3	0	0.2
HC	0	3.0	0	0	0	0.0
	1	5.5	2	3	0	0.4
	2	8.6	2	0	0	0.2
	All	17.1	4	3	0	0.2
SFSR	1	NS[a]	NS	NS	NS	NS
	2	9.7	38	FG[b]	FG	3.9
	3	8.2	38	FG	FG	4.6
	C[c]	2.6	0	FG	FG	0.0
	All	20.5	76	FG	FG	3.7
VC	1	10.9	0	0	0	0.0
	3	8.3	2	1	2	0.2
	Mainstem	33.2	4	2	2	0.1
	5	10.5	0	0	0	0.0
	All	43.7	4	2	2	0.1
WFYF	1	7.0	6	0	0	0.9
	2	4.6	3	3	0	0.7
	All	11.6	9	3	1	0.8

a Stratum 1of SFSR was not surveyed in 1994.

b FG = Live adults counts and carcass data are available from IDFG.

c Curtis Creek is a major tributary to the SFSR

Table D6. Summary of chinook salmon redds counted, live chinook salmon adults observed, dead chinook salmon carcasses sampled, and redds per kilometer by stratum for six tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). Multiple ground counts were conducted between mid August and the end of September, 1993.

Stream	Stratum	Stratum length (km)	Redds counted	Live adults	Carcasses counted	Redds per kilometer
BVC	3	12.7	63	3	33	4.9
	4	11.2	18	0	2	1.6
	5	4.0	1	0	1	0.3
	6	2.3	6	0	0	2.6
	7	5.5	0	0	1	0.0
	All	35.7	138	8	84	3.9
EFSR	1	6.3	15	17	2	2.4
	2	5.1	4	2	0	0.8
	3	7.5	0	0	0	0.0
	4	8.1	0	0	0	0.0
	All	27.0	19	19	2	0.7
HC	0	3.0	2	1	1	0.7
	1	5.5	26	19	5	4.8
	2	8.6	15	37	7	1.7
	All	17.1	43	57	13	0.4
SFSR	1	8.7	25	FG[a]	FG	2.9
	2	9.7	293	FG	FG	30.2
	3	8.2	348	FG	FG	42.4
	C[b]	2.6	28	FG	FG	10.8
	All	29.2	694	FG	FG	23.8
VC	1	10.9	8	0	1	0.7
	2	14.0	38	15	17	2.7
	3	8.3	24	6	21	2.8
	Mainstem	33.2	70	21	39	2.1
	4	3.6	0	0	0	0.0
	5	10.5	3	0	0	0.3
	6	5.0	0	0	0	0.0
	All	52.3	73	21	39	1.4
WFYF	1	7.0	6	0	0	0.9
	2	4.6	6	3	0	1.3
	All	11.6	14	5	0	1.2

a FG = Live adults counts and carcass data are available from IDFG.

b Curtis Creek is a major tributary to the South Fork Salmon River.

Table D7. Summary of chinook salmon redds counted, live chinook salmon adults observed, dead chinook salmon carcasses sampled, and redds per kilometer by stratum for six tributaries of the Salmon River: Bear Valley Creek (BVC), East Fork Salmon River (EFSR), Herd Creek (HC), South Fork Salmon River (SFSR), Valley Creek (VC), and West Fork Yankee Fork Salmon River (WFYF). Multiple ground counts were conducted between mid August and the end of September, 1992.

Stream	Stratum	Stratum length (km)	Redds counted	Live adults	Carcasses counted	Redds per kilometer
BVC	3	12.7	22	16	7	1.7
	4	11.2	4	6	3	0.4
	5	4.0	0	0	0	0.0
	6	2.3	0	0	0	0.0
	7	5.5	0	0	0	0.0
	All	35.7	26	22	10	0.7
EFSR	1	6.3	0	0	0	0.0
	2	5.1	1	0	1	0.2
	3	7.5	0	1	0	0.0
	4	8.1	0	0	0	0.0
	All	27.0	1	1	1	0.0[a]
HC	1	5.5	0	0	0	0.0
	2	8.6	3	4	0	0.3
	All	14.1	3	4	0	0.2
SFSR	1	NS[b]	NS	NS	NS	NS
	2	9.7	292	FG[c]	FG	30.1
	3	8.2	154	FG	FG	18.1
	C[d]	2.6	8	FG	FG	3.1
	All	20.5	454	FG	FG	22.1
VC	1	10.9	0	0	0	0.0
	2	14.0	5	12	5	0.4
	3	8.3	2	3	6	0.2
	All	33.2	7	15	11	0.2
WFYF	1	7.0	0	0	0	0.0
	2	4.6	6	6	0	1.3
	All	11.6	6	6	0	0.5

a Actual calculated redds/km were 0.04.
b Stratum 1 of SFSR was not surveyed in 1992.
c FG = Live adults counts and carcass data are available from IDFG.
d Curtis Creek is a major tributary to the SFSR